4th

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Women's Technical and Professional Symposium

Lawrence Livermore National Laboratory

October 15-16, 1998

San Ramon Marriott Hotel at Bishop Ranch

San Ramon, California

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4th

Women's Technical and Professional Symposium

Sponsored by the Affirmative Action & Diversity Program
Lawrence Livermore National Laboratory
Livermore, California

October 15-16, 1998
San Ramon Marriott Hotel at Bishop Ranch
San Ramon, California

We would like to welcome you to the fourth LLNL - sponsored Women's Technical and Professional Symposium. This year's theme: "Excellence through the Millennium," focuses on the cutting edge work being done at LLNL and the many contributions of women to our science and technology mission. We hope this Symposium gives each person attending a better idea of the broad scope of the Laboratory's mission and their place within the organization. It is easy to lose sight of the fact that we all work in support of science and technology despite the diversity of our experience. This Symposium provides an opportunity to reflect on our past and to begin to plan our future.

In our daily work lives, it is often difficult to find time to sit back and gain perspective. It is only natural to focus on the challenges and goals we must meet each day, rather than reflecting on more general questions. Where do I fit into the organization? Is my work recognized and valued? Where do I want to be in five years and how do I get there? Over these two days, you will have an opportunity to ask these questions and many more, and we hope that you will gain some insight into not just your work, but yourself. We hope you will gain a new sense of pride in being a part of the work being done at the national laboratories.

This is also a unique opportunity to meet people with different jobs, interests, and aspirations. Networking has often been identified as one of the keys to a successful and fulfilling career and it is all too often neglected in our hectic existence. Use this opportunity to break down the barriers of physical proximity and job assignment that separate us at the Laboratory and meet the people who are helping to bring the Laboratory into the 21st century.

Finally, it is important to remember that while it is difficult to hear one voice in a large crowd, there is strength in numbers. A number of senior leaders at the Laboratory will be attending or participating in the Symposium over these two days. Take this opportunity to have your concerns heard and to offer constructive suggestions for making the organization stronger. Think about what is important to you in your career and areas where improvement or changes would be welcome and discuss them with your peers, many of whom share the same questions and concerns. The diversity of experience represented at this Symposium can be a powerful catalyst for creative solutions. We must take advantage of opportunities to make a difference for the better or they will be lost.

We hope this Symposium is a valuable experience for all participants and thank you for your participation, for without you this event would not be possible.

Kimberly S. Budil, Physicist, Laser Programs Directorate

Linda Mack, Women's Programs Manager, Affirmative Action and Diversity Program

1998 Women's Technical and Professional Symposium Co-Chairs

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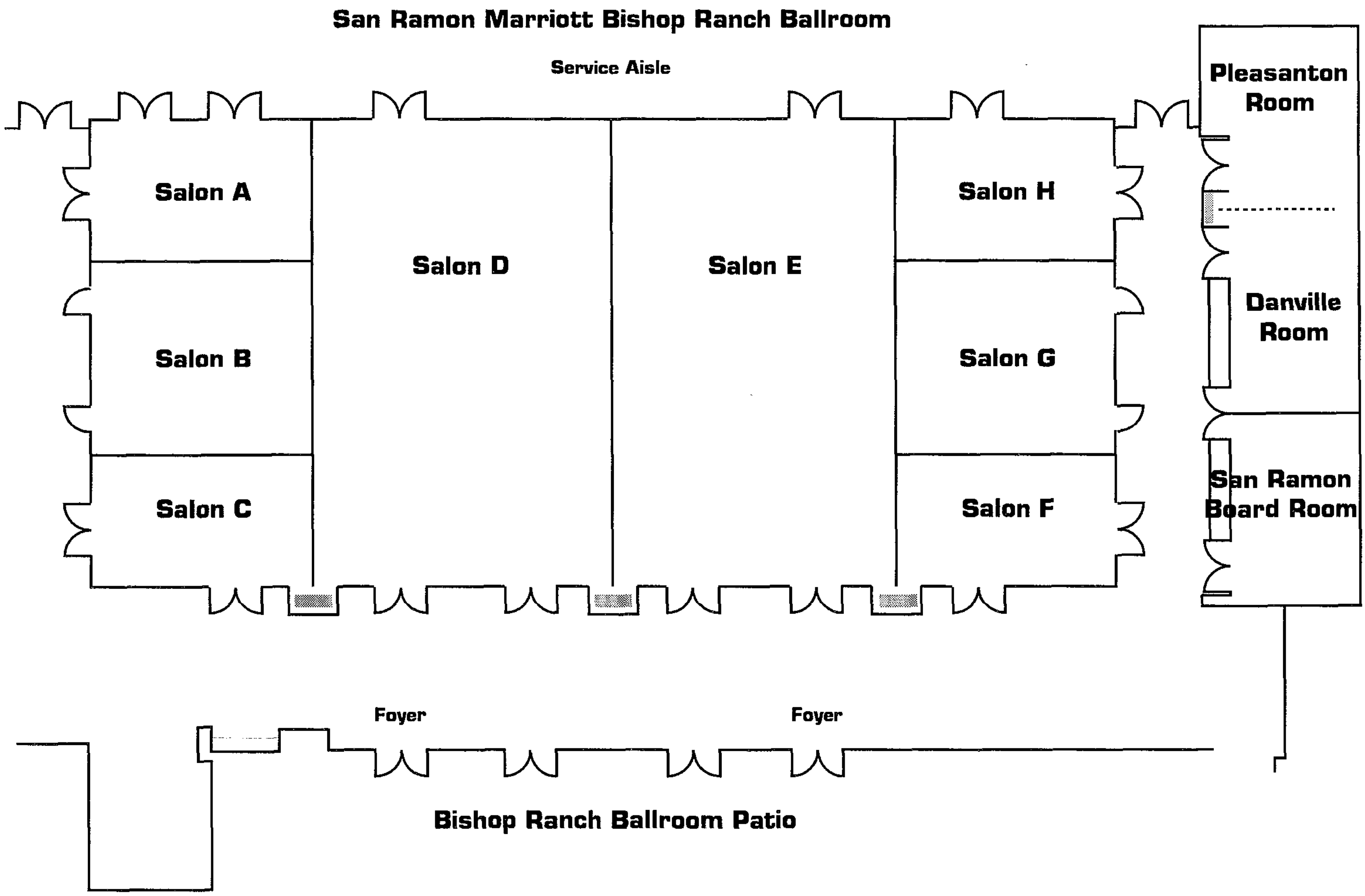
San Ramon Marriott Bishop Ranch Ballroom
Service Aisle
Pleasanton Room
Salon A
Salon D
Salon E
Salon H
Danville Room
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Foyer
Bishop Ranch Ballroom Patio

Agenda for Thursday, October 15, 1998

Start	End	Activity	Location
7:30	8:30	Registration/Hospitality	Lobby
8:30	8:40	Welcome-Kim Budil	Salon E
8:40	9:30	Keynote Address, Elsa Garmire, Professor of Engineering, Dartmouth College "Lasers and Optics in Information Technology Systems"	Salon E
9:30	9:50	LLNL, National Security, and the Need for Cutting Edge Technology George Miller, Associate Director for National Security	Salon E
9:50	10:00	Break/Hospitality	Lobby
10:00	11:30	Sessions I	
		Lasers I: Science and Applications	Salon A
		Biological Sciences and Applications	Salon B
		Fusion	Salon C
		National Security I	Salon F
		Computations I	Salon G
11:30	12:30	Lunch/activity or video	
12:30	1:20	Poster Session and Exhibits	Ballroom
1:20	2:50	Sessions II:	
		Environmental Sciences	Salon A
		Applied Physics	Salon B
		Computations II	Salon C
		Lasers II: National Ignition Facility	Salon F
		National Security II	Salon G
2:50	3:00	Break/hospitality	Lobby
3:00	4:00	Closing Session/LLNL Sr. Leadership Panel "Opportunities and Advancement" Jeffrey Wadsworth, E. Michael Campbell, Harold Graboske, Michael Anastasio, Wayne Shotts	Ballroom

Agenda for Friday, October 16, 1998

Start	End	Activity	Location
7:30	8:30	Registration/Hospitality	Lobby
8:30	8:40	Welcome-Linda Mack	Ballroom
8:40	9:40	Panel Discussion-Women Scientific Leaders: Erna Grasz, Eileen Vergino, Claire Max, Gina Bonanno, Becky Failor, Ellen Raber	Ballroom
9:40	10:40	Keynote Address— Bruce Tarter, LLNL Director Strategic Planning for LLNL	Ballroom
10:40	10:50	Break/hospitality	Lobby
10:50	11:50	Sessions III	
		Building a Winning Proposal Craig Wuest	Salon A
		Non-traditional Career Trajectories Moderated Panel: Eileen Vergino, Nancy Suski, Susan Stoner, Erica Von Holtz, Elaine Chandler	Salon B
		Negotiating Nicole Schapiro	Salon C
		Communications Styles Jeanne-Marie Grumet	Salon G
		This is your life: How to get what you want from an interview Karen Kline	Salon H
11:50	12:50	Lunch/activity or video	
12:50	1:20	Poster Session and Exhibits	Ballroom
1:20	2:20	Sessions IV	
		Dividing Life's Pie- Michelene Ottery	Salon A
		Non-traditional Career Trajectories Moderated Panel: Eileen Vergino, Nancy Suski, Susan Stoner, Erica Von Holtz, Elaine Chandler	Salon B
		Negotiating Nicole Schapiro	Salon C
		Industrial Partnering Sheila Vaidya, Barbara Peterson, Norma Dunipace	Salon G
		Marketing Yourself, Your Project, The Lab- Erna Grasz	Salon H
2:20	2:30	Break/hospitality	Lobby
2:30	3:30	Closing Session-Letter to the Director	Ballroom

Featured Speakers

Day 1-Keynote Address

Lasers and Optics in Information Technology Systems

Elsa Garmire, Professor of Engineering, Dartmouth College

The information age has been enabled in large part by advances in lasers and optics. Computer printers, CD-ROMs, and supermarket scanners all use lasers. Without optical fibers and semiconductor lasers we would not have the internet — optical fiber is being installed world-wide at a rate nearly 90,000 km/day! We are on the verge of entering the "tera era," with information transported on long-haul networks over a terabit/s backbone, processed in computers at teraoperations/s, and stored in terabyte data banks. To meet the needs of computing and communications systems for the next 20 years will require advances across a broad front of transmission, switching, data storage and display systems. Technical challenges include reducing the cost of optical components, packages and systems. This talk will review the state of the art, describe some of the promising research advances, and outline the conclusions reached in the National Research Council's 1998 study "Harnessing Light," of which the speaker was a participant.

Biography

Elsa Garmire is Professor, Thayer School of Engineering, Dartmouth College, Hanover, New Hampshire, where she came in 1995 and served for two years as Dean. Prior to that, she was William Hogue Professor of Electrical Engineering, Professor of Physics, and Director of the Center for Laser Studies at the University of Southern California. The author of over 200 papers with nine patents, she has been a researcher in quantum electronics and in linear and nonlinear optical devices for thirty years. She is a member of the American Academy of Arts and Sciences, the National Academy of Engineering and Fellow of IEEE, the Optical Society of America, the American Physical Society and the Society of Women Engineers. In 1994 she won the Society of Women Engineers National Achievement Award, the highest award of that organization.

Garmire received the A.B. in Physics from Harvard University in 1961 and the Ph.D. in Physics from M.I.T. in 1965 for research in nonlinear optics under Nobel Prizewinner C. H. Townes. She remained at MIT as a postdoctoral fellow for one year and then joined California Institute of Technology, where she was a member of the research staff in Electrical Engineering for eight years. After a short time at Standard Telecommunication Laboratories in England, she joined University of Southern California in 1974. In 1984 Prof. Garmire became Director of the Center for Laser Studies, after 6 years as its Associate Director. She was appointed Professor of Electrical Engineering in 1981 and William Hogue Professor in 1992.

Garmire's research includes nonlinear optics, integrated optics, fiber optics, III-V semiconductor devices, lasers, electro-optics, infrared waveguides, waveguide switches and optical bistability. She has been on the Editorial board of the journals Applied Optics, Optics Letters and Fiber and Integrated Optics, and special feature editor of IEEE Journal of Quantum Electronics. She has graduated 25 Ph.D. students and 12 M.S. students, and worked with 12 post-doctoral fellows and 23 visiting scientists.

In 1993 Prof. Garmire was President of the 12,000 member Optical Society of America. She has also been an elected councillor of the Lasers and Electro-optics Society of IEEE and also of the American Physical Society. She has served on the board of directors of the American Institute of Physics, the executive board of the American Physical Society and on the Joint Council on Quantum Electronics. She has served on the Academic Advisory Board of the National Academy of Engineering, as well as on the visiting committee of the MIT physics department, as well as the Harvard and Duke Engineering schools.

Garmire was on the Air Force Scientific Advisory Board for four years, on the National Science Foundation Advisory Committee on Engineering twice, and was Chair of the NSF Advisory Committee on Emerging Technology. She has consulted for a number of companies, including The Aerospace Corporation, TRW, McDonnell Douglas, Dupont, Honeywell and Kodak.

Day 1-Laboratory Overview

LLNL, National Security, and the Need for Cutting Edge Technology

George H. Miller, Associate Director for National Security

LLNL is a DOE national security laboratory. It seeks to apply science and technology to important national problems of our time. In particular it emphasizes high leverage technological solutions that are beyond the capabilities of industry and academia. In order to do this, the Laboratory draws on broad multidisciplinary teams to address difficult mission-focused problems. Excellence in science and technology is the foundation for assuring a healthy, vibrant laboratory that can continue to evolve with the nation's security requirements and respond to the world's evolving technological threats. This talk reviews how the Laboratory draws on the collective expertise of its various directorates to support the nation's national security challenge.

Biography

George H. Miller is the Associate Director for National Security at LLNL. He received his BS, MS, and PhD in Physics from the College of William and Mary, Williamsburg, Virginia. Upon receiving his PhD, in 1972, he joined the staff of LLNL as a physicist in A-division, one of the Laboratory's two nuclear design divisions. Over almost 30 years at LLNL, Dr. Miller has held various technical management and project leadership positions in the LLNL weapons program and has been responsible for putting several weapon systems into the US nuclear stockpile. In his current position he is responsible for integrated leadership of the LLNL national security programs, which includes nuclear weapons stockpile stewardship, nonproliferation, arms control, international security, and support to DoD programs.

Senior Leadership Panel-Opportunities and Advancement

We have assembled a panel of senior leadership at LLNL to address questions related to opportunities and advancement at the Laboratory. Each panelist has been given a list of questions to prepare their thoughts.

Two example questions are:

- What are you doing to grow the next generation of leaders for your organization?

- How do you know your metrics measure whether your employees are engaged in pursuing your strategic objectives and feel valued?

After the panel has addressed these questions we will take written questions from the audience.

Senior Leadership Panel-
Opportunities and Advancement

Jeffrey Wadsworth, Deputy Director for Science and Technology

Jeff Wadsworth, as Deputy Director for Science and Technology (DDST), serves as the Laboratory's key executive responsible for overseeing the quality of science and technology in the Laboratory's scientific and technical programs and disciplines. He also oversees the management of the Laboratory Directed Research and Development Program, the University Relations Program Office, the DoD Programs Office, the Office of Policy, Planning, and Special Studies, and the Industrial Partnerships and Commercialization Office. Jeff is the Chair of the LLNL Council on Strategic Science and Technology and Co-Chair of the Council of Bioscience and Biotechnologies. Together with the Director and the senior management team, Jeff oversees the Laboratory's strategic planning.

Biography

Jeff received his Ph.D. in 1975 from Sheffield University in Metallurgy. He has authored and co-authored 230 papers in the open scientific literature on a wide range of materials science and metallurgical topics; one book, entitled, "Superplasticity in Metals and Ceramics;" and four U.S. Patents. He is a Fellow of the American Society for Metals, an Adjunct Professor at the University of California at Davis, Department of Applied Science, and a Consulting Full Professor, Materials Science and Engineering at Stanford University.

Jeff joined LLNL in 1992 after working at Lockheed Missiles & Space Company, Inc. in Palo Alto as Manager of the Metallurgy Department. In 1994, Jeff was named Associate Director for Chemistry and Materials Sciences and in 1996, he was appointed to his current position.

Senior Leadership Panel-
Opportunities and Advancement

E. Michael Campbell, Associate Director for Laser Programs

Biography

As Associate Director for Laser Programs, E. Michael Campbell is responsible for the overall program management and technical development of the multidisciplinary Laser Directorate. The major activities of this organization include the Inertial Confinement Fusion Program, the Isotope Separation and Advanced Manufacturing Program, Advanced Microtechnology Program, Imaging and Detection Program, the Remote Sensing Project, as well as the active development of promising new technologies.

Prior to his current position, Campbell was Deputy Associate Director and Program Leader for the Inertial Confinement Fusion Program. In that position, Campbell was responsible for the overall management and technical development of this large program. He held that position from 1991 until his current appointment as Associate Director for Laser Programs in February 1994.

Campbell is a member and Fellow of the American Physical Society, Division of Plasma Physics. He has participated in National Academy panels on plasma, laser, and optical science. He is a recipient of the 1985 U.S. Department of Energy's Excellence in Weapons Research Award for the development of the x-ray laser, the 1990 American Physical Society Award for Excellence in Plasma Physics Research, and the Edward Teller Medal in 1994. Most recently, Campbell was honored with the 1994 E. O. Lawrence Award, presented for distinguished leadership in helping to propel laser-driven inertial confinement fusion to the forefront of physics research, and the Fusion Power Associates 1995 Leadership Award.

He received his B.S. in Mechanical Engineering from the University of Pennsylvania, followed by a M.A. and Ph.D. in Applied Physics, Aerospace and Mechanical Sciences from Princeton University.

Senior Leadership Panel-
Opportunities and Advancement

Harold C. Graboske, Associate Director for Chemistry and Materials Science

Biography

In 1997, Harold C. Graboske Jr. was selected as Associate Director for the Chemistry and Materials Science Directorate. Chemistry and Materials Science is the primary provider of solutions to chemistry and materials problems that are vital to the success of Laboratory programs and institutional goals.

Prior to this assignment, Hal Graboske was Deputy Associate Director in the Physics and Space Technology Directorate.

He began his career at LLNL as a postdoctoral researcher, working with materials at extreme conditions, thermodynamic properties of low mass stars and giant planets, and nucleosynthesis in dense plasmas as well as applied studies in weapons materials. Subsequently, Hal led the theoretical program in the shock physics division prior to becoming the division leader. For the next 10 years, he managed the materials physics R&D program in Weapons, which led to the creation of V Division performing high energy density physics in support of advanced weapons concepts.

Hal Graboske received a B.S. from the Massachusetts Institute of Technology and an M.S. in Physics and an M.S. and Ph.D. in Astronomy from the University of Michigan. His background includes work in aerospace on defense and space programs.

Senior Leadership Panel-
Opportunities and Advancement

Michael R. Anastasio, Associate Director for Defense and Nuclear Technologies (DNT)

Biography

Michael R. Anastasio was born September 25, 1948 in Washington, D.C. He received his B.A. in Physics from The Johns Hopkins University, M.A. and Ph.D. in theoretical nuclear physics from the State University of New York at Stony Brook.

Dr. Anastasio joined Lawrence Livermore National Laboratory in 1980 as a physicist in B-Division, one of the two nuclear weapons design physics divisions. He was involved in the design, evaluation, and understanding of systems both in the stockpile and under development.

In 1986 he was named Program Leader for B Division's boost physics effort and was promoted to Group Leader for one of the design groups within B Division in 1988. In 1990 he received the DOE Weapons Recognition of Excellence Award for technical leadership in nuclear design, specifically for outstanding theoretical and experimental contributions to understanding boost physics.

In 1991 he became B Division Leader and Program Leader for all design, experimental, and computational physics activities associated with primaries and their related technologies, providing the technical leadership and management of both the division and the program.

In February, 1995 he accepted a temporary appointment for five months with DOE to serve as a Scientific Advisor to the Assistant Secretary of Energy for Defense Programs, Dr. Vic Reis, in Washington, D.C, providing advice to the Department on a variety of issues having to do with the DOE Weapons Laboratories and the development and implementation of the DOE Stockpile Stewardship and Management Program.

In January, 1996 he was appointed Acting AD for DNT and became in April, 1997. As such, Dr. Anastasio is responsible for all the major activities in the Laboratory's nuclear weapons program including: research, development, experiments and simulations, weapons engineering, stockpile surveillance, dismantlement, system analysis, and weapon effects.

He and his wife Ann live in Livermore with their two daughters, Alison and Alexandra.

Senior Leadership Panel- Opportunities and Advancement

Wayne Shotts, Associate Director for Nonproliferation, Arms Control, and International Security (NAI)

Biography

Wayne Shotts is Associate Director of the Nonproliferation, Arms Control, and International Security Program (NAI). NAI's mission is to provide the United States Government with advanced technologies and expertise to prevent, reverse, and respond to threats to national and international security.

Previously, Shotts was Deputy Associate Director for Defense and Nuclear Technologies, the directorate responsible for overall integration and execution of the nuclear weapons program at LLNL. During his Laboratory career, he also held the position of Deputy Associate Director for Military Applications, responsible for providing assessments of the utility of weapons systems and of the impact of arms control agreements, as well as for developing nuclear and advanced conventional weapons.

His research experience includes applied optics, nuclear chemistry, electromagnetics, plasma physics, and weapons effects. An area of particular interest to Shotts is nuclear defense policy studies.

Shotts is a member of the American Physical Society and the American Association for the Advancement of Science. He has served as a scientific advisor to DOE defense programs, a technical advisor to the Nuclear Weapons Council Standing and Safety Committee, and as a member of the Navy Steering Task Group. In 1990, he received the E.O. Lawrence Award for National Security.

Shotts earned a B.A. degree in Physics from University of California, Santa Barbara, and a Ph.D. in Physics from Cornell University.

Panel Discussion-
Women Scientific Leaders

This group of scientific leaders from LLNL have been brought together to share their experiences and lessons learned with you. After some discussion of their individual career progressions, this moderated panel will welcome written questions from the audience.

Panel Discussion-Women Scientific Leaders

Erna Grasz, Senior Project Leader for NIF Operations Engineering

Biography

Erna Grasz is an Electrical Engineer for Lawrence Livermore National Laboratory (LLNL) specializing in robotics and automation. Erna completed her BS in Electrical Engineering from Texas Tech University and her MS in Electrical Engineering from Santa Clara University.

She is currently a Senior Project Leader for Operations Engineering leading an organization of 55+ people who are focused on large optics assembly and handling systems for the National Ignition Facility (NIF) Project, which will be the world's largest laser and is currently under construction at LLNL. She has been the Group Leader for Engineering's Automation and Intelligent Systems group, as well as a project leader for numerous environmental and hazardous material projects over her career at LLNL.

In addition, she is a member of IEEE, serves on the Executive Committee of the Robotics and Remote Systems Division of the American Nuclear Society, and is a member of the Society of Women Engineers. She has published numerous papers and articles on robotics, automation, and intelligent systems.

In addition to her professional responsibilities at LLNL, Erna is currently engaged in developing programs to help young students and professionals develop self-confidence and maximize potential. She is accomplishing this via speaking, workshops, and educational outreach.

Panel Discussion-Women Scientific Leaders

Eileen S. Vergino, Special Assistant to the Director of the Center for Global Security Research

Biography

Eileen Vergino is the special assistant to the Director for the Center for Global Security Research as well as the primary contact and science advisor, representing LLNL with US Department of State for International Science and Technology Center (ISTC) and Science and Technology Center of the Ukraine (STCU).

Eileen is the former Director of Education Programs at LLNL, and was responsible for creating, planning, developing, and implementing education outreach programs for regional and national impact for students and teachers from elementary school through graduate degree programs. She worked for over sixteen years as a seismologist in the LLNL Treaty Verification Program. Her research involved seismic yield estimation and discrimination studies, and she published numerous papers on these subjects. Additionally she was the manager for the Information Management and Computational Support within the Treaty Verification Program. Eileen earned a B.S. degreee in Geophysics from M.I.T. She is married and has three children, ages 16, 14, and 7 and enjoys outdoor activities, including bicycling, running, and hiking.

Panel Discussion-Women Scientific Leaders

Claire Ellen Max, Director of University Relations

Biography

Dr. Max is Director of University Relations at the Lawrence Livermore National Laboratory. After graduating from Radcliffe College and Princeton University in Astrophysical Sciences, Max was a post-doctoral fellow in Physics at the University of California, Berkeley before joining the Lawrence Livermore National Laboratory. Max's research interests have included laser-plasma interactions, astrophysical plasmas, and most recently adaptive optics and laser guide stars. She has served on many national committees, including the National Academy of Sciences' Committee on International Security and Arms Control, the National Research Council's Commission on the Physical Sciences, Mathematics, and Applications, and the JASONs.

In her role as Director of University Relations for LLNL, Dr. Max's goal is to strengthen the LLNL and university communities by fostering collaborations in research and educational activities.

Dr. Max is the leader of LLNL's Laser Guide Star Project, whose goal is to demonstrate the feasibility of laser guide stars and adaptive optics for improving the resolution of ground-based astronomical telescopes. This project includes building laser guide star adaptive optics systems for UC's Lick Observatory and for the 10-meter Keck II telescope on Mauna Kea, Hawaii.

Panel Discussion-Women Scientific Leaders

Regina E. Bonanno, Manager for AVLIS Laser Operations

Biography

Regina E. Bonanno is a laser physicist in the Atomic Vapor Laser Isotope Separation Program in the Laser Program Directorate, and currently serves as Manager for AVLIS Laser Operations. She received her Ph.D. in Physical Chemistry from the University of Maryland, in 1984. She then spent two years as a National Research Council Post-Doctoral Fellow at the National Institute of Standards and Technology where she conducted research in the area of ultrasensitve isotope analysis. She joined LLNL in 1986, and prior to her present assignment served as Group Leader for the AVLIS Dye Laser System and lead projects in the area of solid-state laser development for application in the AVLIS Program. Between 1992 and 1994 she managed a small company in the optics industry.

Panel Discussion-Women Scientific Leaders

Rebecca Failor, Division Leader

Biography

Rebecca (Becky) Failor is a Division Leader leading professionals who provide environmental, health and safety support to major programs at Lawrence Livermore National Laboratory. She has worked at LLNL for close to twenty years in a variety of technical and managerial positions.

She holds a Ph. D. in Nuclear Engineering from the University of California at Berkeley with a M. S. and B. S. in Chemistry. Her technical specialty is in low level and natural radioactivity detection. She is a recognized specialist in tritium in the environment.

Dr. Failor also is active in the Math/Science Network, an organization dedicated to supporting women's and girls' interest in science and mathematics. She has worked with Expanding Your Horizons in Science and Mathematics Conferences for eighteen years providing young women with information on mathematics and science based careers.

Panel Discussion-Women Scientific Leaders

Ellen Raber, Deputy Department Head, Environmental Protection Department

Biography

Ellen Raber is the Deputy Department Head of the Environmental Protection Department at Lawrence Livermore National Laboratory. In this role she is responsible for both operational and applied R&D efforts in pollution prevention, waste management, environmental restoration, regulatory affairs, and environmental monitoring and analysis; an effort involving 450 individuals with a current budget of approximately $78M. She has been at the Laboratory for 20 years where she has worked on various technical environmental issues related to geothermal, underground coal gasification, the strategic petroleum reserve and nuclear waste management. Additionally, she spent 10 years leading a materials technology program providing novel solutions for treaty verification and intelligence community applications. Throughout her career, she has been actively involved in development of state-of-the-art groundwater sampling and monitoring techniques for both environmental/regulatory applications as well as applications for international treaty verification and nuclear safeguards. She has authored numerous publications in these areas.

Day 2-Keynote Address

Strategic Planning for LLNL

C. Bruce Tarter, Director

Biography

C. Bruce Tarter was selected by the University of California Board of Regents as the Director of Lawrence Livermore National Laboratory in 1994. He is the eighth director to lead the Laboratory since it was founded in 1952 as a nuclear weapons research facility. Today, the Laboratory Dr. Tarter leads is primarily charged with ensuring that the nation's nuclear weapons remain safe, secure, and reliable and preventing the spread and use of nuclear weapons worldwide.

Prior to his selection as Director, he served as Deputy Director and Acting Director. In these roles, he has led the Laboratory through the transition to a post-Cold War nuclear weapons world amid debate and discussion associated with the future roles and missions of the Department of Energy laboratories.

He has restructured Laboratory senior management, adding external hires and promoting several outstanding Laboratory managers. Dr. Tarter has overseen a significant cost-cutting effort and a broad review of the role of diversity within the Laboratory. He has driven expansion of and emphasis on the Laboratory's relationships with local communities, the Bay Area, and the state of California.

Dr. Tarter's career at the Livermore Laboratory began in 1967 as a staff member in the Theoretical Physics Division. His research concentrated on super-computer calculations of the properties of matter at high temperatures and densities, with applications to nuclear weapons, fusion, energy, and astrophysics. He became head of Theoretical Physics in 1978.

During the 1980s, he became a Laboratory leader in establishing strong institutional ties with the University of California, he served on a number of institutional committees and task forces, and he helped formulate the Lab's strategic direction as a member of the Long Range Planning Committee. In 1988 he joined the ranks of senior management as Associate Director for Physics, a position which he expanded to include weapons physics, space technology leading to the Clementine mission to the moon, and a broadly based environmental program in global climate and other environmental research.

In addition to his Laboratory activities, Dr. Tarter has served in a number of outside professional capacities, including a six-year-period with the Army

Science Board, and is currently a member of the California Council on Science and Technology and a Fellow of the American Physical Society.

Dr. Tarter was born and raised in Louisville, Kentucky. In addition to a strong science and mathematics focus in high school, he was involved in athletics, student government, and music. He went on to receive his bachelor's degree in Physics from the Massachusetts Institute of Technology and his Ph.D. from Cornell University. His doctoral thesis was a theoretical study of astrophysical sources of X-rays. He spent two of his graduate student summers at the Lawrence Livermore National Laboratory working on the magnetic fusion program, and, following receipt of his Ph.D., six months in the aerospace industry.

He is married to Marcia Linn, a professor of science education at the University of California at Berkeley, and is the father of a daughter, Shana. He enjoys playing squash and golf, and likes to travel in both wilderness and urban centers.

Technical Presentations

Sessions I-Salon A
Lasers I:
Science and Applications

AVLIS : From Traditional LLNL Research and Development to Commercial Deployment*

Regina E. Bonanno, Manager for AVLIS Laser Operations

AVLIS (Atomic Vapor Laser Isotope Separation) is a laser-based technology for the enrichment of uranium for use in nuclear reactor fuel fabrication. Development of the AVLIS process began at LLNL in the mid 1970s, and the project is now in the final stages of demonstrating technical and economic viability of the process for commercial deployment of an uranium enrichment plant in 2005. The AVLIS mission has resulted in a number of state-of-the art laser and electro-optic technologies which have been applied in industry, as well as in other Laser Programs. Many aspects of the AVLIS Project are unique to the Laboratory including its relationship with USEC, the recently privatized corporation which owns the rights to AVLIS technology, and directs and funds AVLIS activities at LLNL. With the recent privatization of USEC, AVLIS represents the largest transfer of technology to the private sector in Laboratory history. This presentation will include a review of AVLIS Project history, a description of the isotope separation process and the key technologies used in AVLIS enrichment systems.

*Work performed under the auspices of the U.S. Department of Energy by the Lawrence Livermore National Laboratory under contract number W-7405-ENG-48.

Keywords: isotope separation, uranium enrichment, commercialization

Biography

Regina E. Bonanno is a laser physicist in the Atomic Vapor Laser Isotope Separation Program in the Laser Program Directorate, and currently serves as Manager for AVLIS Laser Operations. She received her Ph.D. in Physical Chemistry from the University of Maryland, in 1984. She then spent two years as a National Research Council Post-Doctoral Fellow at the National Institute of Standards and Technology where she conducted research in the area of ultrasensitve isotope analysis. She joined LLNL in 1986, and prior to her present assignment served as Group Leader for the AVLIS Dye Laser System and lead projects in the area of solid-state laser development for application in the AVLIS Program. Between 1992 and 1994 she managed a small company in the optics industry.

Correctable thermal effects in high gain high average power diode-pumped Nd:YAG rod laser under lasing and nonlasing condition

R. Fluck, M. R. Hermann, and L. A. Hackel

The design of high average power solid-state rod laser systems, operating at high gains, leads to large heat deposited into a small diameter rod. This design criteria results in significant thermal lensing and thermal stress birefringence resulting in beam distortion, phase front aberration and polarization losses. Therefore, the design of efficient high average power rod laser systems must compensate or correct these deleterious thermal effects. The primary design goal leading to correctable thermal effects is a uniform gain profile across the rod diameter. We demonstrate a diode side-pumped Nd:YAG rod which produces a flat gain profile. This results in primarily spherical wavefront distortions, which are correctable up to 100 W heat deposition using a simple spherical lens. Our measured thermal performance shows good agreement with standard theoretical models published elsewhere for both lasing and nonlasing conditions. Furthermore, we demonstrate that birefringence depolarization can be corrected either with two identically pumped rods and a 90° rotator between the rods, or in a single rod cavity using a 45° Faraday rotator. Additionally, we will present results of different birefringence depolarization compensation methods for a single rod polarized resonator cavity. We believe that with this uniform pumping scheme, which allows for first order compensation of thermal effects, we will be able to achieve high average power out of a simple, cost effective laser system.

Keywords: solid-state laser, high average power, thermal management

Biography

Regula Fluck is an experimental physicist in the Laser Science and Technology Program in the Laser Program Directorate. She received her diploma degree in physics and Ph.D. from the Swiss Federal Institute of Technology (ETH), Switzerland, in 1998, where she conducted research on diode-pumped pulsed solid-state lasers. Since joining the LS&T Program her research has primarily focused on high average power oscillator systems.

Crystal growth of $Yb{:}Sr_5(PO_4)_3F$ for 1.047-μm laser operation

K. I. Schaffers, J. B. Tassano, and S. A. Payne (Lawrence Livermore National Laboratory, L-Code 441, Livermore, CA 94550, (510)422-5084); R. L. Hutcheson and R. W. Equall (Scientific Materials, 310 Icepond Road, Bozeman, MT 59715, (406)585-3772); B. H. T. Chai (Crystal Photonics Inc., 3403 Technological Ave., Suite 14, Orlando, FL 32817, (407)275-1115)

Host materials doped with the Yb^{3+} ion have ignited a great deal of interest in the last several years for their use as solid state lasers that can be pumped by InGaAs-based diode lasers.[1] The laser performance of Yb:S-FAP [$Yb^{3+}{:}Sr_5(PO_4)_3F$] has recently been investigated for use in a diode-pumped gas-cooled-slab laser geometry[3] and, currently there is a direct interest in large crystal dimensions of this material up to 6 cm in diameter for a 100 joule, 1 kW, 1 nsec gas-cooled slab laser system. These crystals are not yet commercially available and the growth of high optical quality, low loss material of this size poses a challenge due to a number of crystalline defects. Therefore, an effort has been put forth to study the growth characteristics and defect chemistry of Yb:S-FAP.

Yb:S-FAP crystals show a number of defect structures that occur in various forms; in particular, cloudiness in as-grown boules, core defects, grain boundaries, and cracking in larger diameter boules > 4.0 cm. Each of these defect structures has been studied in considerable detail and solutions to eliminate them have been proposed. Post-growth annealing over the melt, at several hundred degrees below melting, has been employed to remove cloudiness in as-grown boules. Core defects are attributed to unstable growth and the vaporization of SrF_2 from the melt surface. Various methods are now being employed to control the rate of SrF_2 vaporization, thereby reducing the magnitude of these defects in the crystals. Also, the implementation of a larger diameter crucible (3" to 4") has been found to decrease the effects of SrF^2 vaporization from the melt, simply by increasing the available melt volume. Cracking issues are being addressed by lowering thermal gradients in the growth furnace as well as reducing the internal stresses caused by defects. Another critical issue associated with Yb:S-FAP crystals is that of grain boundaries which appear as wavy refractive index changes perpendicular to the *c*-axis. Methods of eliminating grain boundaries are currently being developed from comparison to other crystals that have shown similar characteristics, such as sapphire. Significant progress has been made to date and current growth capabilities have produced >5.0 cm diameter crystals with limited defects.

Keywords: Crystal growth, Yb^{3+} lasers, New laser materials

Biography

Kathleen Schaffers is a chemist in the Laser Science and Technology Program which is part of the Laser Program Directorate. She received her B.S. in Chemistry and her Ph.D. in Inorganic Chemistry/Materials Science from Oregon State University in 1988 and 1992, respectively. Her research assignment entails managing the High Temperature Crystal Growth Facility at Lawrence Livermore Laboratory. This facility is funded to discover and develop new optical materials for advanced laser applications. Dr. Schaffers is also an active member in the American Association for Crystal Growth, Optical Society of American, and served as a board member for the Optical Society of Northern California.

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"Diode-Pumped Solid-State Lasers: Next Generation Drivers for Inertial Fusion Energy and High Energy Density Plasma Physics"

Camille Bibeau, Raymond J. Beach, Christopher A. Ebbers, Mark A. Emanuel, Eric C. Honea, William F. Krupke, Christopher D. Marshall, Stephen A. Payne, Howard T. Powell, Kathleen I. Schaffers, Jay A. Skidmore, and Steven B. Sutton, Lawrence Livermore National Laboratory

Over the past 20 years LLNL has pursued the development and use of high energy lasers for target physics experiments in support of inertial confinement fusion (ICF). The technology upon which this effort has been based is the flashlamp-pumped Nd:glass laser. More than 30 years have elapsed since the first flashlamp-pumped Nd:glass laser was demonstrated, and this technology approach will soon culminate with the construction of the National Ignition Facility (NIF). Flashlamp-pumped Nd:glass lasers have offered crucial advantages (e.g. flexibility in pulse format, wavelength, and spectral width), allowing the progress in ICF physics that has been achieved to date. The slow shot rate of once every few hours, however, limits the number and type of experiments and applications that can be pursued. This limitation need no longer be imposed by the laser technology as first conceptually assembled in the early 1980s by Krupke and Emmett.[1-2] The continuing effort outlined herein will culminate with the development of a new class of high repetition-rate lasers with the proposed Mercury Laser being the first significant step into this new generation of high energy density and inertial confinement fusion lasers.

We have assembled a design for the Mercury laser system. The laser design is predicated upon using a Yb-doped crystal, (Yb-doped strontium fluorapatite, Yb:S-FAP) that offers better diode pump laser costs due to its long storage time, than the traditional Nd-doped glass gain medium. The laser system utilizes three subsystems for pulse amplification: a fiber oscillator, regenerative amplifier, and two power amplifiers. The final amplification stages are accomplished through four passes of the beam through two gas-cooled amplifier head assemblies. The reverser optics allow the beam to be injected and 4-passed through the amplifiers while preserving the image relaying without the need for an optical switch. A deformable mirror either placed at the end of the amplifier path or within the reverser optics path will be used to correct for wavefront distortions incurred during amplification. We have completed an analysis of the laser system's performance. For a nominal operating pump pulse width of 1 ms the predicted energy output is over 100 J with an optical to optical efficiency of 24%. Primary performance goals include 10% electrical efficiencies at 10 Hz with a 2-10 ns pulse length and 1ω energies of 100 J with capabilities for frequency conversion to the second and third harmonic.

Keywords, Diodes, Solid State Lasers, Gas cooling

Biography

Camille Bibeau is a laser scientist in the Laser Science and Technology Program in the Laser Program Directorate. She received her B.S. in physics and mathematics from the University of Oregon and her Ph.D. at the University of California, Davis in 1995. In her first assignment, she was a co-investigator on a two-year internally funded research project to develop advanced, compact, solid-state laser systems for industrial and commercial material processing applications. In her new role, she serves as a Deputy Project Leader of LLNL's Mercury Laser Facility for advanced solid-state laser development for ICF. In addition to her research activities, Dr. Bibeau has been a participant in several educational outreach programs and is currently an adjunct assistant professor at UC Davis. She is an active member of the American Physical Society, the Optical Society of America, and the American Association of Physics Teachers.

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Rapid Growth of Large KDP and DKDP Crystals: The Connection Between Growth Conditions, Size and Crystal Quality

Natalia Zaitseva

The work on rapid growth of KDP-type crystals, mainly KH_2PO_4 (KDP) and $K(D_xH_{1-x})_2PO_4$ (DKDP), was initiated in the early eighties by the need for large aperture single crystal plates in Nova, the world's largest laser. The frequency conversion arrays on Nova are constructed from 27 cm x 27 cm KDP crystals grown, at that time, by traditional techniques. The baseline design for Nova's successor—the National Ignition Facility (NIF) incorporates about 600 41 cm x 41 cm Pockels cell, doubler, and tripler crystals. Depending on the type of frequency conversion used for the NIF, the boules which are needed to yield crystal plates of this size must be about 55 - 60 cm in size. Conventional crystal growth usually takes place at growth rates of 1-2 mm/day for KDP crystals and not faster than 1 mm/day in the case of DKDP. At these rates, it can take more than two years to get a crystal of the size required for NIF.

A rapid growth technique has been developed and successfully used at LLNL in recent years to grow KDP-type crystals at growth rates more than an order of magnitude larger than those obtained with the traditional technique [1]. Crystals of up to 60 x 60 cm^2 in crossection and up to 55 cm in height with the weight about 250 kg have been grown in 1000 L crystallizers specially designed for this project. The progress was made possible due to the scientific and technical research performed to understand the problems connected with scaling the growth process. The effect of different factors, such as impurities, stress, growth rate and regeneration conditions, have been investigated for the case of large crystals.

First measurements of optical quality (depolarization loss, light absorption, wave front distortion and damage threshold) showed that, in general, large rapidly grown crystals can be as good as small crystals grown both by the traditional or rapid techniques [2].

37 x 37 cm^2 and 41 x 41 cm^2 single crystal plates have been cut from the grown crystals for optical measurements and use on Beamlet, the NIF prototype, operating at LLNL.

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Keywords: NIF laser, rapid crystal growth, KDP, DKDP, dislocation structure, crystal optical quality, laser damage threshold

Biography

1974-1993	Research scientist at Moscow State University
1989	Ph.D. from Moscow State University
1993	Invited to LLNL to start rapid growth of KDP crystals for NIF project
1993-1998	Physicist at Laser Program of LLNL
1994	R&D 100 Award for development of fast growth of KDP and DKDP crystals
1997	First NIF size crystals grown at record growth rates for NIF

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I am single (divorced), have two children: son and daughter.

Sessions I-Salon B
Biological Sciences and Applications

Overview of the Human Genome Project

Glenda G. Quan, Stephanie A. Stilwagen

Genomics is the study of the structure and function of the genetic material, DNA. The research conducted at the Human Genome Center at LLNL is part of an international effort to construct a physical map of the 23 human chromosomes and to determine the base sequence of the entire human genome. The Human Genome Project's ultimate goal is to identify the estimated 50,000 to 80,000 genes and to determine their exact base sequence by the year 2005. Lawrence Livermore has focused its sequencing research efforts on human Chromosome 19 and other genomic regions containing DNA repair genes. To date, LLNL has submitted 9.2 million bases of completed genomic sequence to public databases. This genetic information will provide the framework for molecular medicine of the future. Knowledge about the effects of DNA variations between individuals can lead to new ways to diagnose, treat, and someday prevent the thousands of diseases that affect us. The rapidly accumulating genomic sequence has increased the urgency of addressing the many complex medical, legal, and social issues pertaining to the use of this genetic data. (Work performed under the auspices of the U.S. Department of Energy by the Lawrence Livermore National Laboratory under contract number W-7405-ENG-48.)

Keywords: DNA sequencing, human genetics, Chromosome 19

Biography

Glenda G. Quan and Stephanie A. Stilwagen are biomedical scientists in the Biology and Biotechnology Research Program at Lawrence Livermore National Laboratory. Glenda received her B.S. in Integrative Biology in 1995 from U.C. Berkeley. Stephanie received her B.S. in Biological Sciences in 1993 from U.C. Davis. Both began their careers at LLNL as Summer Students working in the Human Genome Project. Their current research focuses on sequencing genes on human Chromosome 19.

Biosensor Design Using Fluorescence Lifetime Techniques

J. Harder, S. Lane, C. Darrow, J. Satcher, and S. Grant, Medical Technology Program

In medicine it is often necessary to determine the concentration of a physiological analyte. One way to achieve this is with fluorescence lifetime measurements. With the use of a fluorescent molecule that selectively binds to the target analyte, indirect measurements of analyte concentration can be made. Upon binding of the analyte to the sensor molecule, the fluorescent properties of the sensor molecule are altered. If the change in fluorescent lifetime is significant, this can be used as a measure of the number of target molecules present. The main advantages of fluorescent lifetime techniques over other methods are insensitivity to both changes in sensor geometry and photobleaching of the dye molecule. Measuring the fluorescence lifetime with the phase-modulation technique allows the use of compact components like LED's and photodiodes to create a small robust instrument.

Keywords: fluorescence lifetime, biosensors, medical technologies

Biography

Jennifer Harder is a Ph.D. student in Applied Science at the University of California, Davis. She is currently working on sensor technologies in the Medical Technology Program in the Laser Program Directorate. She received her B.S. in Electrical Engineering from the University of California, Los Angeles in 1993 and her M.S. in Applied Science from the University of California, Davis in 1995. While at LLNL she has worked on a wide variety of projects including x-ray lasers, laser tweezers, and fluorescent sensor technology.

Marinated Grilled Chicken and Heterocyclic Aromatic Amine Mutagens/Carcinogens

Cynthia P. Salmon, Mark G. Knize, Pilar Pais, James S. Felton, Biology and Biotechnology Research Program

Heterocyclic amines are a class of chemical compounds that are formed during the cooking of foods, especially muscle meats. These compounds cause DNA damage (mutations) in certain strains of bacteria, are associated with colon and breast cancer in laboratory animals, and are suspected to be human carcinogens as well, although the extent of their role in cancer causation is not yet well understood. While more than 20 different heterocyclic amines have been identified, two are especially prevalent in cooked meats: 2-amino-3,8-dimethylimidazo[4,5-f] quinoxaline (MeIQx) and 2-amino-1-methyl-6-phenylimidazo[4,5-b] pyridine (PhIP). Our studies have shown that well-cooked chicken, in particular, can form very high levels of PhIP. We recently demonstrated that PhIP in flame-grilled chicken breast can be reduced dramatically by marinating the meat prior to cooking. The amount of MeIQx in the marinated chicken increases slightly, but only when the chicken is grilled for 40 minutes. Modeling studies, in which we heated the major chemical components of muscle meats — amino acids, creatine, and sugar — to form heterocyclic amines in the laboratory, have confirmed that the chemical composition of chicken breast is responsible for its tendency to form high levels of PhIP. The sugar in the marinade causes the increase in MeIQx, as our modeling studies have proven, but the reason for the decrease in PhIP is unknown. Further work on the formation of heterocyclic amines must be done to fully understand how marinating meat might aid in reducing human exposure to these carcinogens.

Keywords: Food carcinogens, chicken, marinating

Biography

Cynthia P. Salmon is a biomedical scientist in the Molecular and Structural Biology Division in the Biology and Biotechnology Research Program Directorate. She received her B.S. in Biology from Emory University in Atlanta, Georgia in 1976 and her B.S. in Secondary Science Education from Auburn University in Auburn, Alabama in 1977. After teaching high school science for three years in St. Louis, Missouri, she worked for five years at Purdue University in West Lafayette, Indiana as a research scientist in the field of chemical carcinogenesis. She has worked in the food mutagen group at Lawrence Livermore National Laboratory since 1993.

Variations in the metabolism of a dietary carcinogen, PhIP, may predict risk factors for individual susceptibility to breast cancer.

K.S. Kulp, M.G. Knize, and J.S. Felton, Biology and Biotechnology Research Program

Genetic factors can explain the development of only about 5% of all cancers. The remaining 95% are attributable to environmental factors that act together with genetic and/or acquired susceptibility. The correct identification of risk factors and individual susceptibility could play a role in reducing the incidence of cancer. We are studying the metabolism of a genotoxic carcinogen 2-amino-1-methyl-6-imidazo[4,5-b]pyridine (PhIP), which occurs naturally in cooked foods. PhIP has been shown to cause breast cancer in rats. By developing a sensitive method of detection for PhIP and its metabolites in human urine, we can examine the impact that variations in PhIP metabolism may have on developing cancer. Based on these results we can then use human urinary metabolite profiles to predict individual susceptibility to breast cancer due to exposure to PhIP.

We have obtained important preliminary data about the variation of human PhIP metabolism from a study of patients receiving a small dose of radiolabeled PhIP. A comparison of the kinetics of PhIP metabolism illustrates that the disposition of PhIP varies among the humans that we have studied. This is seen through comparison of relative amounts and number of radio-labeled metabolites as well as how these metabolites change over time.

Our studies of human metabolism are significant because the results indicate that metabolism of PhIP in humans differs markedly from that of the rodent. The metabolite found in the largest quantities in the rodent may be a minor metabolite in human urine. The largest human metabolite is not detected in rodent urine. In addition, there is a greater number of metabolite peaks present in the human urine as compared to the rodent, suggesting that PhIP metabolism may be more complicated in the human.

Applying the urinary metabolite analysis to humans will make it possible to assign a metabolic profile for an individual woman that may be an indicator of breast cancer susceptibility, greatly increasing our knowledge of the effect of diet on breast cancer.

Keywords: breast cancer, diet, metabolism, heterocyclic amines

Biography

Kristen S. Kulp is a Post-Doctoral Researcher in the Food Mutagen Group in the Biology and Biotechnology Research program. She received her B.A. in Chemistry from Knox College in Galesburg, Illinois and her Ph.D. from the University of California, Davis in 1995. She spent 1.5 years as a post-doctoral research associate in Davis studying the effects of iron on the levels of cell cycle proteins in breast cancer cells. Since coming to LLNL, her research has focused on linking exposure to food mutagens to causes of breast cancer.

Sessions I-Salon C
Fusion

The International Thermonuclear Experimental Reactor

Susan L. Stoner

The International Thermonuclear Experimental Reactor (ITER) project represents a timely and essential step in realizing the potential of thermonuclear fusion as a virtually limitless and environmentally acceptable source of energy. The European Community and the Governments of Japan, the Russian Federation, and the United States are sharing equally in an international joint venture to design an experimental device to study the technological issues of fusion power. The work is being conducted by a "central" team of scientists and engineers located at sites in Germany, Japan, and the US, with contributions from teams residing in each of the "home" countries. The information developed during the design phase of the project will be the basis for future decisions regarding the construction of ITER.

The reactor design is based on the tokamak concept, which has been developed in fusion programs around the world. Tokamaks consist of a toroidal shaped vacuum vessel surrounded by magnetic field coils to contain the fusion plasma which is formed within the vessel. In ITER, superconducting magnets, operating at cryogenic temperatures, provide the magnetic field to confine the plasma at temperatures of millions of degrees. The vacuum vessel includes large ports for pumping, heating systems, diagnostics, and blanket test modules. These ports also provide access to components such as blanket shield modules and divertor cassettes that face the plasma. All in-vessel components are activated from neutrons and can only be maintained using remote techniques. This is accomplished by remote handling systems that are deployed from sealed transfer casks that connect to the vessel ports. The need to transport these casks to and from the vessel has a large impact on the layout of equipment around the machine. Additionally, the equipment layout takes into consideration requirements for performance, assembly, maintenance, safety, and decommissioning.

Keywords: ITER, fusion, tokamak

Biography

Susan Stoner is a mechanical engineer. She began working at LLNL after receiving her BSME from New Mexico State University in 1984. She pursued her masters degree via satellite from the University of California at Davis while working at LLNL and received her MSME in 1991. Susan is presently on an expatriate assignment in Naka, Japan, where she is assigned to the ITER Joint Central Team. She has been working in Japan since 1994 where her primary responsibility on ITER is the integration and layout of equipment around the machine. Susan is also one of the three ITER design integration liaisons, representing the Naka team on project integration issues. Prior to 1994, Susan worked on materials-related projects in the Engineering Sciences Division and on the design of the physics package for the Short Range Attack Missile in the Weapons Engineering Division.

Laser-drive ICF fundamentals and recent experimental results

S. G. Glendinning

Laser-driven Inertial Confinement Fusion (ICF) has been under investigation at LLNL and other laboratories for decades now; advances in this field will make ignition a reality with the National Ignition Facility. Most of the research in the indirect drive technique has been performed on the Nova laser. The research most relevant to ignition included high-convergence implosions, hydrodynamic instabilities, stable and highly unstable implosions, drive symmetry, energy coupling to lined hohlraums, and laser-plasma interactions. This set of experiments was known as the Nova Technical Contract, proposed to the 1990 NAS review of ICF. The fundamentals of ICF, current ICF diagnostics and experiments as performed on Nova, and a summary of the Nova technical contract will be presented.

Biography

S. Gail Glendinning is an experimental physicist in the High Energy Density Experimental Science Program in the Laser Directorate. She received her BA from Middlebury College in 1973, and her doctorate from Duke University in 1980, where her work was in nuclear physics, measuring and modeling neutron scattering cross sections from p-shell elements. Since joining LLNL in 1985, she has conducted ICF research in indirect and direct drive hydrodynamic instabilities, imprinting of laser spatial modulations in direct drive targets, and hohlraum symmetry diagnosis; she is now involved in hydrodynamic instability experiments relevant to astrophysical systems. In 1995 she shared the APS Division of Plasma Physics Prize for Excellence in Plasma Physics Research and this year was made a fellow of the American Physical Society.

Heavy Ion Driven, Inertial Confinement Fusion

Debra A. Callahan-Miller

Ion accelerators are a very promising driver for inertial fusion energy power production. Accelerators have many of the characteristics needed in a power plant: long lifetime (~30 years), high repetition rate (~10 Hz), and high efficiency (~25-35%). In addition, the final focusing of the ion beam is done with magnetic fields so the focusing system is not damaged by blast. The challenge in heavy ion fusion is to keep the beam quality sufficient to hit the small spot needed by the target (1-3 mm), while keeping the accelerator affordable. Experiments in beam combining and beam bending, 3-d simulations of beam dynamics, and design of heavy-ion targets will be highlighted in this presentation.

Keywords: Heavy-Ion, Fusion, Accelerators

Biography

Debra Callahan-Miller is a physicist in the ICF Applications Group of X-Division in the Defense and Nuclear Technologies Directorate. She earned her PhD from the Department of Applied Science at U. C. Davis in 1994 with a thesis in beam dynamics for heavy ion fusion. She then did a post-doc at LLNL studying beam propagation in a heavy-ion fusion reactor chamber. Since 1996, her research has been in designing heavy ion targets.

Sessions I-Salon F
National Security I

High Energy Density Experimental Science in Support of SBSS*

C. A. Back, S. Alvarez, M. Spragge, J. Bauer, O. L. Landen, R. E. Turner, and W. Hsing

At high-powered laser facilities such as Nova and the upcoming National Ignition Facility, we are able to produce exotic states of matter which cannot be routinely produced in other laboratory settings. We use the laser to produce matter that can be 40,000 to 120,000 times greater than room temperature to study physical processes such as ionization, shock heating and radiative heating. Recently, an experimental program has been established to investigate physics related to the science-based stockpile stewardship program (SBSS). Radiation transport is a main thrust of these experiments along with hydrodynamics. In this talk we will discuss two examples of experiments to understand radiative heating. In the first, we will discuss experiments using a soft-x-ray grating spectrometer to examine mid-Z tracer layers buried in the Au wall of mm-sized enclosures called hohlraums. These hohlraums are typically used to create radiation fluxes that implode capsules in inertial confinement fusion. The bulk of the x-ray flux is emitted in the 500 – 800 eV range and we use the tracer spectral features as a diagnostic of the hohlraum plasma conditions. The second example is of experiments that use the hohlraum radiation to heat a low density foam.

*Work performed under the auspices of the U.S. D.O.E. by LLNL under contract number W-7405-ENG-48.

Biography

Christina Back has been at LLNL in Laser programs since 1992 and is a specialist in developing spectroscopic techniques to diagnose laser-produced plasmas. She received a B.A. in physics from Yale and a Ph.D. studying x-ray emission from laser-produced plasmas from the Univ. of Florida in 1989. As a postdoc, she worked in France and England and continues to have collaborations both in the US and abroad. She has many publications and is a member of the organizing committee of the International Conference on Spectral Line Shapes. Her current research includes experiments on x-ray spectroscopy, opacity, and radiation flow.

Absorption Measurements of High Temperature Plasmas

Marilyn B. Schneider, Keith L. Wong, P. T. Springer, M.E. Foord, C. A. Iglesias, B. G. Wilson, and W. H. Goldstein, Lawrence Livermore National Laboratory

Accurate opacity measurements of high temperature plasmas is needed. These x-ray absorption measurements are complicated by the increasing amount of self-emission of the plasma. A new technique is described which simultaneously measures the absorption and self-emission of a plasma using the parallex created by a double-slit XUV spectrometer looking at a thin plasma target. The plasma is produced by the NOVA laser in a modified scale-1 hohlraum with lips and is in radiative driven thermal equilibrium. The gated imaging spectrometer covers an x-ray energy range of 200 to 1200 eV. Preliminary results on the opacity of 50 eV open M-shell plasmas are discussed. This work was performed under the auspices of the U.S. Department of Energy by Lawrence Livermore National Laboratory under Contract No. W-7405-ENG-48.

Key words: plasma, aborption, opacity

Biography

Marilyn B. Schneider obtained her Ph.D. in physics from Cornell University in 1983. Her thesis was on the lyotropic liquid crystals, which make up cell membranes. She then used a post-doctoral position in the Applied Physics Department at Cornell University to study the structure of the disappearing interface between two fluids as they approach their critical point (and become identical). She joined the L-Division staff at Lawrence Livermore National Laboratory in October 1986. She worked on calibrating the soft x-ray and VUV beam lines at the synchrotron radiation facility (SSRL) at Stanford. She studied dielectronic recombination at the Electron Beam Ion Trap (EBIT) at LLNL. She next studied the mixing of fluids (1) at high accelerations using Linear Electric Motor (LEM) at LLNL and (2) at high shocks using the NOVA laser at LLNL. Presently, she is using the NOVA laser and the OMEGA laser at Rochester to measure the opacity of high-temperature plasmas.

LLNL Archiving Efforts

Chelle Clements, David Anderson and Eric Frerking, Nuclear Weapons Information Project

Archiving implies long-term storage of seldom-used data, but the Nuclear Weapons Information Project (NWIP) is very dynamic and encompasses both information preservation and access activities. NWIP captures at-risk knowledge such as nuclear test data and critical documentation from the test libraries and field notebooks. The captured information is placed in the Nuclear Weapons Information Base, a controlled web-based system. Structuring and formalizing the content and context requires time, effort and support from many sources. At this time we are still adding vast amounts of historical data from many sources and are working on a comprehensive effort across all Defense and Nuclear Technology to make this information more easily searchable and retrievable.

Keywords: Archiving, Stockpile Stewardship

Biography

Chelle Clements is a Senior Scientific Technologist in Defense and Nuclear Technology's "B Division." She has an Associate in Applied Science in Environmental Science Technology from Northern Virginia Community College and is currently working on a Bachelor's in Information Systems Management at the University of San Francisco. Her work with the Nuclear Weapons Information Project involves researching, collecting, preserving and presenting information from all aspects of weapons design and testing.

This work was performed under the auspices of the U.S. Department of Energy by Lawrence Livermore National Laboratory under contract No. W-7405-Eng-48.

SWPP / Pit Reuse Seal Cover Design and Development

Carole A. Le Gall, Structural and Thermomechanical Modeling, Sandia National Laboratories / California

The Submarine-Launched Ballistic Missile (SLBM) Warhead Protection Program (SWPP) is a cooperative effort between the Department of Energy (DOE) and the Navy to exercise and maintain expertise and capabilities related to SLBM warheads within DOE and Department of Defense (DoD) contractors. In the Pit Reuse Project (PRP), SWPP is developing an alternative warhead option for an existing system, intended to provide extended life, high reliability, and increased safety margins. Program deliverables include a written document that will provide the experimental and analytical rational that the option will meet the requirements and could be implemented with high confidence.

The PRP system is contained within a DoD reentry body (RB), and consists of a number of components and subsystems. These include the nuclear explosive package (NEP), the weapon electrical system, and mechanical components such as the forward support, mounting ring, aft mount and seal cover. Each weapon system component must meet a set of system requirements as part of the development program. The primary requirement for the seal cover, for example, is that it seal the RB volume from adverse environmental conditions; it also acts as a structural component in the weapon system, and is required to maintain structural and sealing integrity under various loading conditions.

In this presentation, the development of the SWPP PRP seal cover will be described, beginning with the conceptual design, moving through the analytical modeling and simulation phases, and concluding with fabrication and testing activities.

Keywords: Weapon systems, modeling and simulation, component development

Biography

Carole Le Gall earned her BS and MS degrees in Mechanical Engineering from the Georgia Institute of Technology. She joined the Advanced Weapon Systems Engineering department at Sandia National Laboratories in California two years ago.

As a member of the SLBM Warhead Protection Program (SWPP) Pit Reuse Project (PRP) team, she was involved in component- and system-level design, analysis and testing activities. At the system level, she was the principal engineer for the Structural Thermal Dynamic Unit (STDU) system ground test series. At the component level, she was responsible for the design, analysis and testing of the PRP seal cover, addressing both design and safety issues. She is also involved in vulnerability and hardening issues at the system level. Recently, Carole transferred to the Structural and Thermomechanical Modeling department, where she is responsible for structural modeling of the SWPP Pit Reuse system.

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Systems Engineering and Automation: Getting the Most Out of Requirements Traceability and Management

Debra S. Post, Surety Design Engineering Department, Sandia National Laboratories/California

As weapon lifecycles increase and development times decrease, modern systems engineering methodologies become increasingly important. Systems engineering tools are now available commercially to support the development and deployment of complex systems. Such tools focus on the development of a robust set of requirements which trace back to customer needs, capture critical design decisions, and are clearly allocated to hardware deliverables. Some tools even allow simulation of system-level events in order to allow the validation of behavioral requirements. For example, in RDD-100 (from Ascent Logic Corporation), one can simulate the response of an arming and fuzing system to missile signals which occur at various stages of flight. Use of such tools forces a rigorous, disciplined systems engineering process which ensures all requirements trace to deliverables, all deliverables satisfy requirements (either originating from the customer or derived by the systems engineer), and that behavioral requirements make logical sense. In this presentation, we will describe the implementation of a specific systems engineering tool, RDD-100, on a defense program, and relate our lessons learned so that you can clearly understand the benefits and limitations of systems engineering tools.

Keywords: Systems engineering, modeling and simulation, requirements engineering

Biography:

Debra Post joined Sandia National Laboratories/California fifteen years ago after earning a BSEE from the University of Washington, Seattle, and an MSEE from the University of California at Davis. Debra has worked on a wide variety of defense projects. Debra developed target tracking algorithms for directed energy and kinetic energy weapons for the Strategic Defense Initiative. Debra supported the nations nuclear stockpile for several years, working on nuclear safety and reliability issues. Moving to an analysis group, Debra participated in war games which focused on the efficient deployment of advanced conventional munitions, i.e. "smart bombs." Debra next worked on modeling and simulation for weapon electrical systems. For the past two years, Debra has supported weapon systems engineering efforts by investigating requirements engineering tools and modern systems engineering methodologies.

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Sessions I-Salon G
Computations I

Computer Science Research to Break the 100 TFLOP Barrier

Terri Quinn

ASCI's unprecedented simulation capabilities demand a unique computational environment that includes advanced code development tools, high performance storage systems, state of the art visualization tools, and high speed data networks. To build this environment computer science research worthy of study by the best and most creative minds is needed. ASCI anticipates needing to archive tens of petabytes of data (one petabyte equals one million gigabyte). To illustrate the magnitude of this size, ten petabytes is equivalent to 50 times the entire contents of the Library of Congress or 400 times the size of the existing classified storage at LLNL's computer center. ASCI simulations are expected to be on the scale of one billion zones running on 10,000 or more processors. Today few simulations run in parallel and mostly on only 100s of processors. Few software development tools exist for parallel computers and this will be compounded as the size of these computers increases as planned. Once these simulations are run the resulting data sets will break visualization and data management tools because of their size, and to even move these data sets it will take hours to send over high-speed networks.

ASCI abounds with computer science needs and research. The three DOE labs that collaborate on ASCI, LANL, Sandia, and LLNL, are ramping up their lab's computer science expertise, but we all recognize that this will not be enough. We are funding universities and industry to partner with us. I will go into more detail about two of these research areas. One is software tools for massively parallel computers and the other is parallel I/O. I will describe the research, results, and partnerships we are pursuing to solve these problems.

Keywords: ASCI, parallel computing, computer science research, parallel I/O, parallel software development tools

Biography

Terri Quinn is the Program Manager for LLNL's ASCI (Accelerated Strategic Computing Initiative) Problem Solving Environment (PSE). She received her B.A in Mathematics from UC Irvine and her M.S. in Engineering, Applied Science from UC Davis. Much of her laboratory background is in computer science developing scientific applications for finite difference codes and hydrodynamics simulations. Her previous position was Division Leader within the Computer Applications Organization in Computations.

Experience with Python and C^{++} in a Large-Scale Scientific Application

Katherine Price

Kull is a large-scale inertial confinement fusion simulation application being developed at Lawrence Livermore National Laboratory. The code is a multi-physics application that consists of a number of loosely coupled physics modules implemented with C++ or Fortran. The compiled physics modules are driven by the interpreted scripting language Python. Modern software development concepts such as object orientation, strong type-safety, inheritance, templatization, and steering can substantially reduce the development and maintenance effort of large-scale applications. We describe our problems and successes with some of these mechanisms during the development of Kull.

Keywords: Software Development, Object Orientation, Steering, C++, Python

Biography

Katherine Price is a computer scientist working on large-scale scientific applications development at Lawrence Livermore National Laboratory. She has a BS in Computer Science and Mathematics and a MS in Computer Science from Purdue University.

Large Eddy Simulation of Rayleigh-Taylor Instability using the Arbitrary Lagrangian-Eulerian Method

R. Darlington, T. Mcabee, G. Rodrigue

This research addresses the application of the Arbitrary Lagrangian Eulerian (ALE) method to Rayleigh-Taylor instability problems. Finite volume methods are used on a simply connected grid. Direct numerical simulation is compared with various large eddy simulations. Several eddy viscosity models are used, including the Smagorinski model, Smagorinski with Leith's buoyancy extension, and a single equation K model.

This work was performed under the auspices of the United States Department of Energy at the Lawrence Livermore National Laboratory under contract number W-7405-Eng-48.

Keywords: computational fluid dynamics, Rayleigh-Taylor instability, arbitrary Lagrangian-Eulerian, large eddy simulation

Biography

Rebecca Darlington is a graduate student at UC Davis's Department of Applied Science. She received her B.S. in Physics for the University of New Hampshire in 1993 and is seeking a Ph.D. in the next year. She is conducting thesis research with B Division at LLNL.

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Performance of ALE3D on the ASCI machines

Evi Dube, Computer Science Project Lead, LLNL

ALE3D is one of the ASCI program's major application codes, solving problems, for example, that undergo gross deformation, such as in metal forming processes like casting, forging, and extrusion. This three dimensional code system uses the arbitrary Lagrange/Eulerian (ALE) technique to solve hydrodynamics equations coupled to thermal and chemical transport. As an ASCI application code, it runs on the various ASCI machines in parallel, using several parallel paradyns.

We will first discuss the types of applications solved by ALE3D, along with the motivation for needing to run large, massively parallel problems on these ASCI machines. Finally, we will present information on the performance of ALE3D running in parallel on the ASCI Blue Pacific, Blue Mountain, and Red machines.

Keywords: application code, ASCI, parallel

Biography

Evi Dube is the Computer Science Project lead on the ALE3D code system. She started at LLNL in 1984, and through the years has enhanced her profesional background in scientific computing, with emphasis working on supercomputers and currently parallel, distributed memory machines. Besides working at the Lab, she completed her Ph.D. (1996) in Applied Science/Computational Science from UC Davis. Her thesis work has been applied to the ALE3D project.

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Sessions II-Salon A
Environmental Sciences

Pollution prevention computer tools*

Sabre Coleman, Katharine Gabor, and Barbara Nisbet

Pollution prevention and waste minimization is included as a Performance Measure within Appendix B of Contract 48, and there are several federal Executive Orders and State of California regulations that outline requirements for waste minimization and pollution prevention. The Pollution Prevention Group (PPG) within the Environmental Protection Department at LLNL identifies opportunities to reduce pollution, provides technical guidance on pollution prevention projects, and selects and designs waste-reduction technologies and equipment. PPG staff uses a variety of tools to complete their mission.

We will present computer tools that staff at LLNL can use to research the effectiveness and cost of alternative chemicals and technologies. We will show how to get internet information from others who have used the alternative chemicals or technologies at LLNL, other DOE facilities, as well as other federal facilities. We will also present computer links to home pages set up by EPA and other agencies that list case studies, contacts, and pros and cons of the chosen chemical or process. Many of these alternative technologies and chemicals outperform conventional ones, can be cheaper over the life of the project, and are safer to humans and the environment.

*Work performed under the auspices of the U.S. Department of Energy by the Lawrence Livermore National Laboratory under contract number W-7405-ENG-48.

Keywords: pollution prevention, computer tools, waste minimization

Biography

Sabre Coleman is an engineer in the Pollution Prevention Group (PPG) of the Environmental Protection Department. She received her B.S. in civil-environmental engineering from Brown University and her M.S. in environmental and water resources engineering from the University of Michigan, Ann Arbor in 1991. She initially worked at Illinois Power Company in Decatur, Illinois. She then worked as an environmental engineer from 1983 - 1988 for CH2M Hill, where she predominantly worked in the wastewater area. She joined the Environmental Protection Department at LLNL in 1989 where she worked on environmental issues associated with tanks, including being the Tank Assessment and Guidance Group Leader for four years. In 1996, she joined PPG. Recent assignments include being the pollution prevention specialist for ES&H Team 3 and being the LLNL contact on a pollution prevention complex-wide project for water conservation.

Practical Applications of Solar Technology for Village Life Sustainable Development

Hattie Carwell, US Department of Energy, Oakland, CA

This paper provides information on a project designed to develop a solar cottage industry in Akwasiho Village in Ghana. It describes a three-phase approach, which uses solar cooking as an introduction to solar energy, and expands to the development of a Solar Living-training center. One primary objective of the project is to develop manufacturing capability in the Village as a means of sustainable development. Woman's development is a primary focus of the project. Research conducted at the University of Science and Technology at the Kumasi by the Solar Research Laboratory is used in the development of this plan.

Keywords: solar, energy, manufacturing

Optimization Of A Combined Treatment Process For The Remediation Of VOC- and Radiologically-Contaminated Filter Media

Dianne D. Gates-Anderson and Socorro M. Painter

This paper summarizes the outcome of a two-stage treatability study that was completed to optimize the treatment of a difficult-to-treat mixed waste. The waste to be treated was composed of spent diatomaceous earth and granular activated carbon contaminated with high levels of volatile organic compounds (VOCs) and low levels of radionuclides. The primary VOCs in the waste were 1,1,1-trichloroethane (TCA), trichloroethene (TCE), and perchloroethene (PCE) at concentrations as high as 380,000, 2,700 and 56,000 mg/kg, respectively. The goal of the treatments evaluated was to reduce the VOC levels in the waste to below land disposal requirements which would allow the treated residual to be stabilized and disposed of by landfilling. The treatment processes evaluated included air sparging, surfactant solubilization, and chemical oxidation with H_2O_2 and $Fe_2(SO_4)_3$ (Fenton's reagent). Initial experiments were conducted using 50-g batches in 250 mL bottles. Following completion of the initial studies, pilot-scale studies were conducted in a specially fabricated 10-gallon tank reactor. During the pilot-scale studies, the waste was treated in 2-kg batches. The results of these studies will be used during the treatment of over 2000 kg of waste in fulfillment of regulatory requirements to treat legacy waste at the LLNL site.

Keywords: Remediation, Mixed Waste, Hazardous Waste

Biography

Dianne D. Gates-Anderson is a process engineer in the Waste Treatment Group of the Hazardous Waste Management Division. She has a bachelor's degree in Chemical Engineering from Oklahoma State University and master's and doctorate degrees in Environmental Engineering from the University of California, Berkeley. Her current work focuses on the physical/-chemical remediation of hazardous and mixed waste.

Socorro M. Painter works as a process chemist at the Waste Treatment Group of the Hazardous Waste Management Division. She has a bachelor's degree in Chemistry and a master's degree in Environmental Management. She has more than 16 years experience in the field of environmental health and safety.

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Sessions II-Salon B
Applied Physics

Petawatt Class Lasers and Applications to Laser- Matter Interaction Experiments

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The Petawatt Laser Project was initiated to develop the capability to test the fast ignitor concept[1] for inertial confinement fusion (ICF), and to provide a unique capability in high energy density physics. The laser was designed to produce near kJ pulses with a pulse duration adjustable between 0.5 and 20 ps, which produces > 1.25 PW peak power.. The laser system begins with a Ti:sapphire chirped pulse amplification system operating at 1053 nm. The pulse is temporally stretched to ~ 3 ns, then amplified, producing a spectrally shaped pulse at near kilojoule levels. Near diffraction limited beam quality is achieved with the use of a deformable mirror wavefront correction system to correct for static, thermal, and pump-induced aberrations in the amplifier chain. Following amplification, the chirped pulse is compressed in vacuum by a pair of 94-cm-diameter diffraction gratings arranged in a single pass geometry. Focusing the beam is accomplished using an on-axis parabolic mirror, in conjunction with a secondary plasma mirror. Currently, a peak irradiance of 4 x 1020 W/cm^2 has been achieved.

A number of experiments have now been performed to examine the creation of hot electrons and their use in the Fast Ignition approach to ICF. By changing the experimental conditions, the electron spectrum can be shifted towards higher energy (10-100 MeV), even in solid-density plasmas. In this regime (1020 to 1021 W/cm^2), the laser target interaction is dominated by the enormous light pressure and relativistic effects. High-energy bremsstrahlung x-rays generated by these electrons in the gold target produced photonuclear reactions in both the gold and surrounding copper target-holder producing activation and transmutation to platinum and nickel daughter isotopes. In addition to these data, neutron spectra and other high energy x-ray spectra are measured. Together, these diagnostics are providing us the first glimpse into this new regime of laser-matter interactions.

*This work was performed under the auspices of the U.S. Department of Energy by the Lawrence Livermore National Laboratory under Contract No. W-7405-ENG-48.

References:

1. M. Tabak, J. Hammer, M. E. Glinsky, W. L. Kruer, S. C. Wilks, J. Woodworth, E. M.Campbell, M. D. Perry, and R. J. Mason, *Phys. Plasmas*, Vol. 1, pp. 1626-1634, 1994.

Keywords: lasers, ultrafast laser-matter interactions, fast ignition

Biography

Deanna M. Pennington is an experimental physicist in the Laser Science and Technology Program in the Laser Program Directorate. She joined the Laser Program in 1985, working on high power laser development for inertial confinement fusion, and the nonlinear optical phenomena associated with these lasers. She received a B.S. in Physics from the University of California at Davis, an M.S. in Physics from Rensselaer Polytechnic Institute and a Ph.D. in Chemical Physics from the University of California, Berkeley in 1992, where she studied ultrafast laser-surface interactions. She is currently the project leader for the Petawatt Laser Project at LLNL.

Clinical Accuracy of PEREGRINE Dose Calculations

Rosemary S. Walling

Radiation therapy for the treatment of cancer requires accurate dose predictions—too little radiation does not destroy the tumor; too much radiation can cause damage to healthy tissue. Consequently, the safety and effectiveness of radiation therapy is acutely dependent on the accuracy of the treatment plan that determines where the radiation is aimed and how it is configured. PEREGRINE is a three-dimensional Monte Carlo radiation transport system designed to provide the most accurate dose calculations for radiation therapy treatment planning ever achieved.

We have developed and executed an extensive testing strategy, using over 1,200 independent clinical measurements to validate PEREGRINE dose calculations. These tests stress the physics algorithms for a full range of relevant material types, material densities, beam energies, and beam modifiers for a wide variety of patient-like configurations. The PEREGRINE dose calculation system accurately calculates the absolute dose when tested against these clinical measurements and achieves a major milestone towards FDA certification for clinical use.

Keywords: peregrine, radiation, therapy

Biographical Sketch

Rosemary Walling is Test Manager for the PEREGRINE program. She has a Masters Degree from Boston University in Physics and a PhD in Applied Science from University of California at Davis. Rosemary acquired extensive experience using large simulation codes for the design and interpretation of laser-produced plasma experiments. Previous projects included computer simulations for plasma spectroscopy, x-ray lasers, laboratory astrophysics, ultra-short-pulse lasers, and the Stockpile Stewardship Management Program (SSMP).

Clinical Significance of PEREGRINE Dose Calculations in the Treatment of Cancer

Christine L. Hartmann Siantar

The purpose of the PEREGRINE program is to save lives by improving the cure rate for cancer. High-accuracy, high-speed, high-resolution dose calculations are now feasible and economical using PEREGRINE, a three-dimensional Monte Carlo dose calculation system designed specifically for radiation therapy planning. Much of our knowledge of the physics of radiation that is needed to develop better treatments for cancer—how radiation is produced, how it travels, and how it interacts with various materials—comes from our past research into nuclear weapons. The strength of Monte Carlo is its ability to deliver precise dose calculations in regions with numerous anatomical structures and tissue interfaces.

To the medical community, the question is no longer one of establishing PEREGRINE clinical significance nor of clinical accuracy, but only a question of how to bring the technology to the clinics. PEREGRINE is now in a unique position for the next big advance in radiation therapy—computer optimization of radiation beams providing even more accurate dose delivery for each individual patient.

Keywords: peregrine, medical, cancer, radiation

Biography

Christine Hartmann Siantar is the principal investigator of the PEREGRINE program. She received her B.S (1986) and Ph.D. (1991) in medical physics from the University of Wisconsin. Prior to joining Lawrence Livermore in 1994, she gained experience in cancer treatment planning at the Medical College of Wisconsin. Christine was instrumental in defining the clinical requirements of the PEREGRINE program and is responsible for clinical collaborations with leading medical research institutions across the nation. Christine was given the prestigious Department of Energy Young Independent Scientist Award and Presidential Early Career Award for Scientists and Engineers in 1996 for her outstanding contributions to the PEREGRINE program.

Experimental Thermal Conductivity and Contact Conductance of Graphite Fiber Composites

Marian Chrisma Jackson

Thermally induced failures due to the compact design of electronic packages has forced the industry to develop new materials that can dissipate heat more effectively while still maintaining a low coefficient of thermal expansion. Furthermore, these materials should resist environmental corrosion. The electronics industry is currently exploring the use of graphite fiber organic matrix composites as a potential substitute for ceramic mold compounds currently used in electronic devices. In a series of tests presented here, the transverse and longitudinal effective thermal conductivity and contact conductance of graphite fiber reinforced composites have been studied over a range of temperatures (20 (C to 200 (C) and pressures (172-1723 kPa). Three different fiber types of fibers (DKE X, DKA X and K22XX) and three fiber volume percentages (55%, 65%, and 75%) in a cyanate ester matrix were studied. The addition of fibers to the matrix resulted in an increase in effective thermal conductivity, but appears to level off at fiber volume fractions of 65%. Furthermore, the effective thermal conductivity in the longitudinal direction was significantly greater than that in the transverse direction and was more dependent on temperature. These data were used to develop an equation relating the thermal contact conductance to the harmonic mean thermal conductivity, sample thickness, and fiber volume fraction.

Keywords: Graphite Fiber, Composites, Thermal Conductivity

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Livermore Optical Transient Imaging System (LOTIS)

Hye-Sook Park

Gamma ray bursts (GRBs) are brief bursts of gamma rays occurring once/day at random locations in the sky. Despite constant study by orbiting satellites, the mechanism of this powerful events is not understood. The LOTIS experiment is a dedicated telescope system searching for simultaneous optical counterparts of GRBs. By measuring simultaneous optical light curves associated with GRBs, we will greatly advance our understanding of GRB physics. The short duration (~0.1-100 sec) and poor directional precision (~1-10 deg) of GRBs require a rapid response, wide-field-of-view system to perform simultaneous observations of an entire GRB error box. LOTIS is fully automated and is linked to the NASA's GRB Coordinates Network (GCN) which together allow imaging of an initial GRB position beginning ~8-15 sec after the start of a burst. LOTIS has been operating since Oct. 1996 and recorded many interesting events; some were recorded while the GRB was still emitting gamma rays. This provides the most stringent optical to gamma flux limits for the GRB production mechanism. This paper will describe the LOTIS system and the results from this experiment.

Keywords: astrophysics, gamma ray bursts, wide-field-of-view telescope system

Biography

Dr. Hye-Sook Park received her Ph. D. from the University of Michigan working on the IMB proton decay experiment that detected neutrinos from a super nova explosion in 1987. She worked at UC Berkeley in an experiment that searched for fractional charge particles. Since 1987 she has been working at LLNL on various projects including wide-field-of-view telescope system, Flight Experiments, CLEMENTINE, and GROCSE experiments. Currently, she is the principal investigator for LOTIS project which searches for simultaneous gamma-ray burst optical counterparts, and she is in charge of developing detectors for the proton radiography project that attempts to radiograph thick material with high spatial and temporal resolutions utilizing energetic proton beams.

Sessions II-Salon C
Computations II

Applying Process Rigor to Control Systems Operations

Kimberly Cupps

The AVLIS (Atomic Vapor Laser Isotope Separation) project is currently involved in a series of runs to demonstrate readiness for commercial deployment of the AVLIS process. The Control Systems Operations group is responsible for ensuring continuous operation of AVLIS control systems while at the same time responding to and completing requests for increased system capability or new functionality. These often conflicting goals have required the institution of several key processes to manage our work.

This talk will give a very brief overview of the AVLIS control system, describe a typical application challenge we have faced and discuss two of the processes we have put in place and their effectiveness in helping us achieve our operational goals.

*Work performed under the auspices of the U.S. Department of Energy by the Lawrence Livermore National Laboratory under contract number W-7405-ENG-48.

Keywords: control systems, AVLIS, operations

Biography

Kimberly Cupps is a Computer Scientist in Computations LCPD Division and supports the Atomic Vapor Laser Isotope Separation Program (AVLIS). She is currently the AVLIS Control Systems Operations Group Leader and in that position manages a group of 20 technicians and engineers responsible for the continuous operation and maintenance of the AVLIS control systems. Kim is also a Computations Group Leader responsible for the administrative management of a group of ten Computer Scientists who support AVLIS in various roles. Kim has a B.A. in Applied Math and received her M.S. in Computer Science from CSU Chico, in 1990. She spent six years as a programmer for ROLM/IBM and a startup company developing voice and data applications. She joined LLNL as a student employee in 1990 working on parallel compiler research before joining the Laser and Computations Programs Division in 1992.

ASCI Scientific Data Management

Celeste Matarazzo, Scientific Data Management Project of the ASCI Problem-Solving Environment Effort

The vast amounts of data produced by supercomputing applications have overwhelmed scientists, whose efforts to understand their results are hindered by inadequate data management tools. The three ASCI Labs, LANL, LLNL and SNL, are developing a joint solution to scientific data management (SDM) that will allow scientists to store, retrieve, and search data within the natural context of their work. The resulting products form an integrated environment that provides graphical user interfaces with web and Java-based components that can speed and enhance a user's ability to browse and search their data collections. This SDM framework integrates commercial databases, mass storage systems, networking and computing infrastructure, in order to assist users in managing the complexity and scale of their data. Towards these objectives, we are developing SimTracker, a calculation summary tool, and E-Notes, a meta-data editing and browsing tool. In this talk I will give an overview of the ASCI SDM project, describe the architecture we are deploying, and discuss SimTracker, E-Notes, and our future tool development efforts.

Keywords: Data Management

Biography

Celeste Matarazzo is a computer scientist working on the ASCI (Accelerated Strategic Computing Initiative) program. Currently, she is a project leader and technical contributor working with a team of computer scientists designing and developing a scientific data management solution for ASCI application developers and end-users. This work includes defining data models and seamlessly integrating databases, mass storage systems, networks, and computing resources to provide intelligent assistance in managing terabytes of complex data. Previous positions included developing software for climate modeling simulations, output devices and defense applications. She has a Bachelor of Science degree in Mathematics and Computer Science from Adelphi University.

High Performance Computing Capabilities for ALL LLNL researchers or (How LLNL Researchers Got Their Computing Back)

Jean Shuler

The Laboratory's Multiprogrammatic and Institutional Computing (M&IC) Initiative was created in 1995. The concept was to bring tailored, cost-effective computing services to LLNL programs and scientists. The Livermore Computing Center provides many services under this initiative. Jean Shuler will talk about how this program has grown substantially in the last few years and describe some of the innovative services and resources that are available. She will talk about how these services, such as access to high end visualization servers, high performance storage systems and access to parallel computing resources, have opened up opportunities for all LLNL researchers and their industrial and university collaborators.

Keywords: Computing

Biography

Jean Shuler graduated with a degree in Mathematics from the College of William and Mary in Virginia. She has worked as a computer scientist in several areas at LLNL including applications programming, storage, computer graphics, and is currently the Group Leader for the Customer Service and Support Group at Livermore Computing. This group is responsible for helping scientists and researchers use the high performance computing resources to their fullest potential.

She has also been involved in recruiting, educational outreach programs, and the vendor user groups.

Sapphire: Data Mining and Pattern Recognition for Large and Complex Science Data

Chandrika Kamath

Our ability of gather data far exceeds our ability to explore and analyze it. As a result, much useful information in the data is overlooked. To address this problem, a new effort was recently set up in the Center for Applied Scientific Computing. This project, Sapphire, uses techniques from data mining and pattern recognition to help scientists explore their data effectively and efficiently. These techniques are applicable to data in many domains, including visualization, verification and validation, climate modeling, astrophysics, computational steering, etc. The goal of Sapphire is to find ways to make the search for patterns in large, complex, multi-dimensional data sets tractable. Our research focuses on the following:

- Use of wavelets for multi-resolution analysis
- Scalable algorithms for pattern recognition
- Dimension reduction techniques for high dimension data
- Parallel implementation of algorithms

Keywords: Data mining, pattern recognition, image processing

Biography

Chandrika Kamath is a computer scientist at the Center for Applied Scientific Computing. She earned her Ph.D. in Computer Science from the University of Illinois at Urbana-Champaign in 1986. Prior to joining LLNL in 1997, Chandrika was a Consulting Software Engineer at Digital Equipment Corporation, where she developed high performance mathematical software for the Digital Extended Math Library. Chandrika is currently the project lead for Sapphire, a project in large-scale data mining and pattern recognition. Her research interests are in the area of high performance scalable computing, especially the solution of large sparse systems of linear equations, pattern recognition, data-mining, image processing, object oriented programming, parallel computing, and software development.

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Sessions II-Salon F
Lasers II:
National Ignition Facility

National Ignition Facility

Monya Lane

Design for Environment for the National Ignition Facility*

Elizabeth Cantwell, Katharine Gabor, John Celeste, and Steve Cerutti

Design for Environment (DfE) is a blossoming field, with a number of methodologies and definitions applied to it. In general, any means of accomplishing the goal of minimizing environmental life cycle impacts can be thought of as an element of DfE. The DfE concept involves developing an understanding of and consideration for minimizing environmental impacts over the lifetime of a project, and mitigating potential environmental impacts by overlaying this understanding directly onto the design of the project.

The National Ignition Facility (NIF) will be a U.S. Department of Energy (DOE) national center to study inertial confinement and the physics of high energy and pressure. It will be used by scientists from a multitude of different institutions and disciplines to support research advancements in national security, energy, basic science, and economic development. In NIF, 192 extremely powerful laser beams will "ignite" small fusion targets, helping liberate more energy than is required to initiate the fusion reactions.

NIF management supported an evaluation of the Design for Environment opportunities within the NIF Project, which was completed in 1997. In part, this report made recommendations for focused studies that might also have immediate impact in areas of concern to Project management (i.e., environmental compliance, cost, etc.). This paper will discuss the DfE process for the NIF, and some of the follow-on activities which have resulted from the initial study.

*Work performed under the auspices of the U.S. Department of Energy by the Lawrence Livermore National Laboratory under contract number W-7405-ENG-48.

Keywords: pollution prevention, design for the environment, National Ignition Facility

Biography

Elizabeth Cantwell is a mechanical engineer in the Pollution Prevention Group (PPG) of the Environmental Protection Department. She received her B.S. in mechanical engineering form the State University of New York at Stony Brook and her Ph.D. from the University of California, Berkeley in 1992. She worked from 1984 - 1992 for NASA where she designed environmental systems for manned space missions. She spent two years working for the U.S. EPA and then joined PPG at LLNL. Recent assignments include being the pollution prevention specialist for NIF and working on cost/benefit and risk assessment studies associated with groundwater remediation efforts for the State of California.

A Novel Transport-Vehicle Design for Moving Optic Modules in the National Ignition Facility

Erna Grasz and Detlev Tiszauer, National Ignition Facility Project

The National Ignition Facility, currently under design and construction at Lawrence Livermore National Laboratory, will be the world's largest laser when complete. The NIF will use about 8,000 large optics of 26 different types to focus up to 192 laser beams on a dime-size target. Given the constraints of the NIF operating environment, the tasks associated with optics transport and handling require a novel, versatile transport system. The system will consist of a computer system containing guidance, traffic management and order entry functions, and four or more automated laser-guided vehicles. This transport system will transport optics enclosures that are essentially portable clean rooms and will lift, align, and position them as needed to contact and engage mating points on the laser support structure.

Keywords: automated guided vehicle; line-replaceable unit; transport and handling system; laser guided vehicle

Biography

Erna Grasz is an Electrical Engineer for Lawrence Livermore National Laboratory (LLNL) specializing in robotics and automation. Erna completed her BS in Electrical Engineering from Texas Tech University in 1985 and her MS in Electrical Engineering from Santa Clara University in 1990.

She is currently a Deputy for Operations Engineering focused on optics assembly and handling systems for the National Ignition Facility (NIF) Project, the world's largest laser which is currently under construction at LLNL. She has been the Group Leader for Engineering's Automation and Intelligent Systems group, and a project leader for numerous environmental and hazardous material projects over her career at LLNL.

In addition, she is a member of IEEE, serves on the Executive Committee of the Robotics and Remote Systems Division of the American Nuclear Society, and is a member of Society of Women Engineers. She has published a variety of papers on robotics, automation, and intelligent systems.

In addition to her professional responsibilities at LLNL, Erna is currently engaged in developing programs to help young students and professionals to develop self confidence, and maximize potential. She is accomplishing this via speaking, workshops, and educational outreach.

Precision Assembly and Alignment of Large Optic Modules for the National Ignition Facility

Pat Hurst and Kaye Sivori

The National Ignition Facility (NIF), currently under design and construction at Lawrence Livermore National Laboratory (LLNL), will be the world's biggest laser when complete. The NIF's large optics will be assembled into modules, known as Line Replaceable Units (LRUs), and will be the biggest ever assembled in a clean room environment. Some of the assemblies will weigh as much as 3,000 lb.

The National Ignition Facility has an aggressive schedule for initial installation and activation of the multi-pass, 192 beam, high power, neodymium-glass laser. The optics will be assembled and aligned in the NIF Optics Assembly Building (OAB), adjacent to the huge Laser and Target Area Building (LTAB), where they will be installed. To accommodate this schedule, rapid assembly and align large aperture optics into LRUs will occur through the use of automated handling, semi-autonomous operations, and strict protocols. The OAB will have to maintain rigorous cleanliness levels, achieve both commonality and versatility to handle the various optic types, and allow for just-in-time processing and delivery of the optics into the LTAB without undoing their strict cleanliness and precise alignment.

This presentation describes the project's design philosophy of modularity and hardware commonality. We present the many design challenges we have tackled, as well. For example, an LRU typically includes a mechanical housing, laser optics (lasers and mirrors), utilities, and actuators; the optics are fragile and require delicate handling; and the mechanical parts to be cleaned vary greatly in geometry, surface finish, and material, and range in size from tiny machine screw parts to frame-like mechanical structures as long as nine feet. Of course, we also present our solutions.

We describe in detail how, by using a mixture of commercially available and newly designed equipment, we have developed unique systems for assembly and alignment, inspection and verification, and LRU loading and transfer. We also describe the performance trade-offs, the stringent cleanliness verification requirements, and the prototyping accomplishments achieved to date.

Biography

Kaye Sivori is a Mechanical Designer for Lawrence Livermore National Laboratory(LLNL). She is currently a lead designer in the Optical Assembly and Alignment group of the Operations Engineering Division of NIF. Her responsibilities currently include ProE modeling the Optical Assembly Building used thru-out the NIF project. Her design challenges include building interfacing, mechanical componently and equipment lay-out used to assemble optics and equipment in the Optical Assembly Building. Kaye was previously the drafting instructor at Las Positas College and has taught for years as part-time instructor. She is currently a member of the East Bay ProE/User Group and the Women's Association at LLNL.

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Wavefront Distortions Predicted on the National Ignition Facility

Janice Lawson, Ed English, Jr., John Miller, Diane Chambers, Bob Addis, Mike Richardson, Chris Stolz, Mark Henesian

The performance of the National Ignition Facility (NIF), especially in terms of the ability to focus energy on target, will be determined by several key factors. Previous publications have documented the importance of specifying of the power spectral density (PSD) and wavefront gradient of the thousands of large aperture optics that will comprise the 192 beamlines. In this talk, we describe additional sources of wavefront distortion, specifically those due to causes other than optics manufacture. These sources include lens misalignment, coating stresses and humidity sensitivity, gravity deformation of large optics and pump-induced distortion of the gain media. Our ability to predict the type and magnitude of these distortions is critical for assuring wavefront correction methods on NIF are adequate to assure performance. We will present details of analysis and calculations which allow us to predict the amount of wavefront distortion expected on NIF.

Keywords: National Ignition Facility, wavefront distortion, laser performance

Biography

Janice Lawson joined the Laser Program in 1985 after receiving a M.A. degree in Chemistry from the University of California, Santa Barbara, and a B.A. degree from the University of Tennessee, Knoxville. While working in the Inertial Confinement Fusion (ICF) Program, she pursued a Ph.D. degree from the University of California, Davis, Department of Applied Science, completing her Ph.D. in June 1992 in the area of advanced laser materials. Janice accepted her current position after completing a one and a half year assignment in the DOE's Office of Research and Inertial Fusion. She is currently a member of the Laser Science and Technology Program, working in the Laser Modeling and Optimization (LMO) Associate Program. Her current responsibility is support for the National Ignition Facility (NIF) Project's Opto-Mechanical Systems Team as Optics Specification Lead in the Optical Design Group.

Sessions II-Salon G
National Security II

Nonproliferation Challenges: Where We've Been; Where We're Going

Mary E. Ward, International Assessments Division, Nonproliferation, Arms Control, and International Security Directorate

A relatively small number of countries have made serious efforts to develop a nuclear weapons capability, but these cases pose significant problems for the international nonproliferation regime and, in some cases, for US national security. What do past nonproliferation failures and successes tell us about the relative effectiveness of various tools and levers for implementing US nonproliferation policy? This is a particularly important question for LLNL's NAI Directorate, which contributes to US nonproliferation goals through technical assessments of proliferator capabilities and vulnerabilities, development of surveillance and monitoring tools, and emergency response planning. Future proliferation challenges will undoubtedly also benefit from technology developments at LLNL and elsewhere, but may well require novel, broad-based approaches to address increasing concerns about the proliferation of biological and chemical weapons.

Keywords: proliferation, nuclear weapons, weapons of mass destruction

Biography

Mary E. Ward is an analyst in the International Assessments Division of the Nonproliferation, Arms Control, and International Security Directorate. She received her BS in Nuclear Engineering from MIT and her MS and Ph.D. in Nuclear Engineering from the University of Michigan, completing the Ph.D. degree in 1985. She then worked for several years at Bettis Atomic Power Laboratory, developing computational tools for naval reactor design and improved safety analysis. Since joining LLNL in 1987, she has held a number of positions in the International Assessments Division, most related to assessments of proliferant nuclear fuel cycle capabilities. Her current assignment focuses on improving the effectiveness of export controls on nuclear and nuclear-related equipment, materials, and technology.

Do the TTBT and JVE Provide a Framework for "Effective" Verification?

Eileen S. Vergino

The Threshold Test Ban Treaty (TTBT) was signed in 1974 by Richard Nixon and Leonid Brezhnev with both the US and USSR agreeing to adhere to the 150 kT limit of the treaty as of March 31, 1976. Yet the treaty remained unratified for more than twelve years and during this time, during the height of the Cold War, the US and USSR continued to accuse one another of violating the treaty. Additionally, while there was continuing international pressure to ratify the TTBT and begin negotiation of a CTBT, the TTBT remained unratified. Indeed the TTBT remains the only treaty in which the US decided that effective means of verification did not exist and that it would be necessary to go back and negotiate additional protocols before the treaty would be ratified.

During late 1987, during the Nuclear Testing Talks in Geneva the Joint Verification Experiment (JVE) was discussed and then was formally announced at the Shultz/Shevardnadze meeting in December, 1987. Just a short few weeks later with unprecedented speed, exchange visits were not only planned but carried out. In January 1988 a US team of scientific and policy experts visited the Russian test site at Semipalatinsk, Kazakhstan followed a short time later by a Soviet scientific and policy team who visited the US test site in Nevada. The technical experts continued to meet in Geneva to plan the JVE. Information and data, including data for five Soviet and five US nuclear tests, were exchanged. These data included unprecedented geologic, geophysical, seismic and yield data. This activity culminated with Kearsarge, detonated on August 17, 1988 and Shagan, detonated on September 14, 1988.

The JVE provided a unique opportunity for technical experts from the US and USSR to work together to demonstrate that effective verification of the TTBT could be achieved. Additionally it provided unprecedented transparency and confidence building between the two superpowers, and provided the US with confidence that the treaty could be adequately verified, and in September of 1990 the US Congress ratified the TTBT.

This spirit of collaboration, openness and exchange did not end with the JVE. The Soviets monitored two more explosions at NTS and the US prepared to monitor tests at the Soviet test sites. Additionally, technical discussions continued and a little more than one year later the Soviets provided information regarding an additional 96 nuclear explosions. Though a nuclear test moratorium was declared by both the US and the Soviet Union, and the technical experts from both countries have continued to meet to discuss adequate verification of a CTBT. Finally, a few short years later, following the breakup of the Soviet Union, the same scientists who had worked together so diligently to ensure the success of the JVE continued their collaborations in new programs such as the Lab-to-Lab program, the International Science Centers and Materials Protection, Control and Accountability programs.

The TTBT was the first treaty in which the US pursued a series of complex protocols involving additional, intrusive verification measures. These required extensive collaboration between scientific and political communities, a collaboration necessary to address the balance between the technical capabilities and requirements and the political drivers and needs. During this talk I will discuss this balance, how the balance changed with time, the drivers for change and the lessons learned, and whether there are lessons to be learned that are applicable to the development of other, future, arms control agreements.

Biography

Eileen Vergino is the special assistant to the Director for the Center for Global Security Research as well as the primary contact and science advisor, representing LLNL with US Department of State for International Science and Technology Center (ISTC) and Science and Technology Center of the Ukraine (STCU).

Eileen is the former Director of Education Programs at LLNL, and was responsible for creating, planning, developing, and implementing education outreach programs for regional and national impact for students and teachers from elementary school through graduate degree programs. She worked for over sixteen years as a seismologist in the LLNL Treaty Verification Program. Her research involved seismic yield estimation and discrimination studies, and she published numerous papers on these subjects. Additionally she was the manager for the Information Management and Computational Support within the Treaty Verification Program. Eileen earned a B.S. degreee in Geophysics from M.I.T. She is married and has three children, ages 16, 14, and 7 and enjoys outdoor activities, including bicycling, running, and hiking.

Gamma-ray Imaging with a Single HPGe Detector

Judith Kammeraad, Dean Beckedahl, Allen Friensehner, Greg Schmid, Lawrence Livermore National Laboratory and Jerry Blair, Bill Payne, Art Goldberger, Bechtel Nevada, North Las Vegas

Radiation detectors have many applications in nuclear nonproliferation programs, including the detection and quantification of nuclear materials of both known and unknown origin. For example, high purity germanium (HPGe) detectors are used for the assay and accountability of special nuclear materials in the DOE complex. These detectors, which provide an excellent measure of the spectrum of emitted gamma-rays, have become the international standard for measurements of the isotopic content of the nuclear materials being analyzed.

By dividing the outer electrode of a HPGe detector into a number of electrically isolated segments and digitally analyzing the signals received simultaneously from each segment, one can determine the locations where gamma-rays interact in the detector. This information can be used in conjunction with knowledge of the physics of gamma-ray interactions (primarily Compton interactions in this case) to determine the location of the radioactive source and potentially an image of the source. The expected performance of a cylindrical HPGe "Compton camera" will be described, based upon extensive computer modeling and measurements with an unsegmented detector.

Work performed under the auspices of the U.S. Department of Energy by Lawrence Livermore National Laboratory and Bechtel Nevada under Contract W-7405-Eng-48.

Biography

Ph.D., Nuclear Physics, University of Wisconsin, 1983; B.S. Physics, Hope College, 1976; LLNL: Staff Physicist in Prompt Neutron and Gamma-Ray Measurements, L-Division, 1983-1992; Section Leader for Nuclear Science Applications, Isotope Sciences Division, 1992-97; Materials Program Liaison to NAI, C&MS Directorate, 1998 to present.

Key words: Nonproliferation, radiation detection, gamma-ray imaging.

Second Line of Defense: U.S. Nuclear Detection Technology to Help Secure Russian Borders*

D. Y. Ball, A. Dougan, S. A. Erickson, and J. H. Richardson

A new DOE program entitled the Second Line of Defense was initiated this year to cooperate with Russian Federation (RF) Customs to reduce smuggling of nuclear material. Russia is almost twice the size of the US, borders 14 other countries, and has hundreds of border crossings (land, seaports, and airports) plus RF Customs control points thereby presenting unique problems for Russian customs officials. DOE's Material, Protection, Control and Accounting program (MPC&A) attempts to secure fissile material at Russia's nuclear installations, thus representing the "first line of defense" against theft of nuclear material; the Second Line of Defense assists Russia in preventing the smuggling of illicit nuclear materials and equipment across the border. LLNL is conducting an overall strategy study to determine how to proceed in helping Russian Customs fortify their borders. The DOE has agreed to provide initial funding to purchase and install Russian-manufactured equipment at key Russian border crossings. LLNL is overseeing an effort to provide equipment and training at a seaport on the Caspian Sea. A detection system at the Moscow airport will include a system of portal monitors and video surveillance equipment, using technical experts from LANL. The use of Russian equipment is emphasized. LLNL is also leading a multi-laboratory team to look at active interrogation techniques that can be used to detect shielded nuclear material. We are also cooperating with Russian agencies to develop training programs. *Work performed under the auspices of the U.S. Department of Energy by the Lawrence Livermore National Laboratory under contract number W-7405-ENG-48.

Keywords: nuclear smuggling

Biography

Dr. Deborah Y. Ball is a political-military analyst specializing in Russian affairs in the Proliferation Prevention and Arms Control Program of the Nonproliferation, Arms Control and International Security (NAI) Directorate at Lawrence Livermore National Laboratory. She received her Ph.D. from the University of Michigan. She has been a fellow at Harvard University's Center for Science and International Affairs, as well as Stanford's Center for International Security and Arms Control. Her current work focuses on preventing the theft of weapons-usable nuclear material from the former Soviet Union. Her other interests include the safety and security of nuclear weapons in the former Soviet Union, Russian military and political affairs, and civil-military relations. Ball's articles have appeared in journals such as *Jane's Intelligence Review, Post-Soviet Affairs,* and *Armed Forces and Society.*

Poster Presentations

Precision Assembly and Alignment of Large Optic Modules for the National Ignition Facility

Leslie Allison

The National Ignition Facility(NIF) is currently under design and construction at Lawrence Livermore National Laboratory, which upon completion will be the world's biggest laser. NIF is a 192-beam, high-power, neodymium-glass laser. The NIF Optics assembled in this facility will be the largest modules ever assembled in a class 100 environment. Some of these assemblies weigh as much as 3,000 lbs.

The large optics will be assembled into modules known as line replaceable units (LRUs). Optics will be assembled and aligned in the Optics Assembly Building (OAB), then installed in the Laser and Target Area Building (LTAB). Class 100 cleanroom conditions will have to be maintained from start to finish to prevent contamination of the optics, which would compromise the integrity of the shot.

The equipment shown in this poster is the result of design concepts that took into account not only the modularity of the project, but also the need for hardware commonality. The versatility designed into these units is necessary to accommodate the various LRUs. The Herculift is a powered-assist lift to be used in the OAB for insertion of the optics into the LRU. The ErgoTech is a programmable positioner. These units were selected because of their usability in a class 100 cleanroom and also for their ability to work together. The most important test made on these units and all equipment to be used in the OAB is Cleanliness Verification. A procedure is prepared for each piece of equipment to analyze the materials of construction of each individual part to ensure that they do not pose contamination hazards. The tools needed to accomplish this procedure are a laser-diode-based aerosol particle counter, a velocity meter, and a CO^2 fogger. After all the data has been collected, it is then analyzed based on the parameters of a class 100 clean room.

Biography

Leslie Allison is a Senior Mechanical Technologist for Lawrence Livermore National Laboratory currently working on the NIF project, where she is assigned to the Optics Assembly Area. Her responsibilities include cleanliness verification, contamination control, establishing cleanroom procedures and protocol, and building and personnel safety issues. Her background is broad after 21 years, but most noteworthy is her well documented work on The Fabrication of Polymer Shells Using a Depolymerizable Mandrel. She is also a member of the Institute of Environmental Sciences.

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Direct observation of fluid-clay interactions with implications for mechanical and electrical properties*

C. Aracne-Ruddle, D. Wildenschild, B. Bonner, and P. Berge

When measuring sound speed in dilute sand-clay mixtures, observed changes in energy transmission have indicated that the pore fluid composition, as well as the amount of clay, may influence the acoustic properties of the medium. We devised an experiment to directly observe how sand and clay particles interact on the grain scale. An optical microscope was used to observe changes in clay morphology as a function of the chemistry of the pore fluid. We used a pure silica sand with grain sizes between 74-420 microns and a median diameter (d50) of 273 microns, mixed with 1, 3, and 10 weight-% of sodium montmorillonite, a swelling clay. The wetting fluids were deionized water and a 0.1 N $CaCl^2$ solution. For the dry sand-clay mixture, we observed that the clay particles would electrostatically cling to the sand grains, tending to bridge the gaps and thus influence the acoustic and electrical properties of the combined medium. As expected, due to the chemical interactions between the clay and the water, the clay particles swelled to occupy the available pore space between sand grains when wetted with deionized water. Subsequently, when wetted with $CaCl^2$, the clay particles settled and clumped together to form larger clusters or flocs by a process called flocculation. The flocculation process depends mainly on the charge that may be present on the particles in solution. The charge on each particle may repel the other particles and keep the material in suspension, or it may cause the particles to be attracted to each other and form clusters (or flocs). The visual observation of these phenomena verifies our initial assumption that fluid-clay interactions can play a major role when making acoustic and electrical measurements on natural soils. For more information, please visit our web-site at http://www-ep.es.llnl.gov/www-ep/esd/expgeoph/Berge/EMSP.

Keywords: experimental geophysics, soil properties, visualization

Biography

Chantel Aracne-Ruddle is a senior scientific technologist in the Experimental Geophysics Group in the Earth and Environmental Sciences Directorate. She is working on her B.S. in Chemistry. She has been working at LLNL since 1984 and has worked on a multitude of projects including the High Pressure Diamond Anvil Cell Project, the Yucca Mountain Project, and a project on Joint Inversion of Geophysical Data.

Dorthe Wildenschild, Brian Bonner, and Patricia Berge are geophysicists in the Experimental Geophysics Group.

*Work performed under the auspices of the U.S. Department of Energy by Lawrence Livermore National Laboratory under Contract Number W-7405-ENG-48

Ergonomics at LLNL*

C. Bennett, J. Michael, and P. Tittiranonda

Ergonomics is the science of designing the workplace, equipment, and jobs to fit people. The Lawrence Livermore National Laboratory (LLNL) ergonomic program is a proactive approach for prevention and management of ergonomic illnesses and injuries. It consists of management and employee training and education as well as worksite evaluations.

This poster session will present information on the ergonomic resources available to employees and examples of some of the ergonomic furniture and equipment.

Keywords: Ergonomics, ergonomic furniture/equipment, and employee education.

Biography

Cheryl Bennett is a staff member of the Assurance Review Office. She received a M.S. in Occupational Health and Safety Engineering from Texas Tech University in 1982, after completing a B.S. degree in Safety, with Human Factors/Ergonomics emphasis. She studied safety and ergonomics in Japan on a research internship at Fujitsu, Ltd. She provided systems safety, human factors, and industrial safety support for the Life Sciences Flight Experiment Division of National Aeronautics and Space Administration (NASA) at Ames Research Center, before joining the Hazards Control Department at LLNL in 1986. She has conducted safety and health oversight assessments in the Director's Office Assurance Review Office since 1992.

Preliminary results from an environmental geophysics project for improving geophysical imaging of fluid distribution in the shallow subsurface

Patricia A. Berge, James G. Berryman, Brian P. Bonner, Jeffery J. Roberts, Dorthe Wildenschild

The purpose of this project is to develop a computer code for joint inversion of seismic and electrical data to improve underground imaging for site characterization and remediation monitoring. The computer code developed in this project will invert geophysical data to obtain direct estimates of porosity and saturation underground, rather than inverting for seismic velocity and electrical resistivity or other geophysical properties. This should improve the state-of-the-art of underground imaging significantly, so that interpretation of data collected at a contaminated site will be much less subjective. Potential users include DOE scientists and engineers responsible for characterizing contaminated sites and monitoring remediation of contaminated sites. In this three-year project, we use a multi-phase approach consisting of theoretical and numerical code development, laboratory investigations, tests on available laboratory and borehole geophysics data sets, and a controlled field experiment, to develop practical tools for joint electrical and seismic data interpretation. We are now in the second year of the project. We will present results to date from this work. Results from controlled laboratory experiments on sand-clay mixtures improve our understanding of the connections between measured geophysical properties and the parameters that control fluid distribution and flow (porosity, saturation, and permeability). Results from theoretical work include determining how to use appropriate effective medium theories and available physical properties information in algorithms for relating geophysical measurements to porosity, saturation, and permeability. Other results include new guidelines for planning and carrying out geophysical field experiments for improved site characterization. For more information on this project, please see the world-wide web page at:

http://www-ep.es.llnl.gov/www-ep/esd/expgeoph/Berge/EMSP/

This work was performed under the auspices of the U.S. Department of Energy by the Lawrence Livermore National Laboratory under contract No. W-7405-ENG-48 and supported specifically by the DOE Office of Energy Research within the Office of Basic Energy Sciences, Division of Engineering and Geosciences. This project is funded as part of the Environmental Management Science Program (EMSP), a pilot program managed jointly by the Office of Energy Research and the Office of Environmental Management.

Keywords: geophysics, environmental site characterization, rock physics

Biography

Patricia A. Berge, Brian P. Bonner, and Jeffery J. Roberts are geophysicists in the Experimental Geophysics Group, Dorthe Wildenschild is a hydrogeologist in the Experimental Geophysics Group, and James G. Berryman is a geophysicist in the Computational Physics Group, within the Geophysics and Global Security Division of the Earth and Environmental Sciences Directorate. Patricia A. Berge is the principal investigator for this project.

Restoration of *Amsinkcia grandiflora*

Erin Bissell

The goal of the study is to investigate techniques for the restoration of *Amsinkcia grandiflora,* an endangered wildflower. Plots were established in an experimental population and then treated with a grass specific herbicide. The demographics of marked plants in the plots were monitored prior to and following the herbicide treatment. Plots treated with herbicide contained more forb cover and less grass cover than untreated plots. The height of *A. grandiflora* was greater in the untreated plots, but survivorship was less than that observed in treated plots. In addition, germination tests were conducted on nutlets collected from two experimental populations to determine the germination potential of the nutlets. Nutlets of various ages were germinated, and distinct differences were observed in the timing of germination. In general, older nutlets germinated more quickly than younger ones.

Keywords: *amsinkcia grandiflora,* endangered species, wildflowers

Biography

Erin Bissell is a recent graduate of Montana State University with a B.S. in Biology. As an Associated Western Universities fellow, she is participating in cooperative research with Tina Carlsen of the Environmental Restoration Division at Lawrence Livermore National Laboratory. Her research focus is on endangered plant management and restoration. She intends to attend graduate school and pursue a career in plant ecology.

Population biology of the rare tarplant, *Blepharizonia plumosa ssp. plumosa (Asteraceae)*

Tina M. Carlsen and Steven D.Gregory

Blepharizonia plumosa ssp. plumosa is a rare tarplant found in the summer flora component of the California grasslands. We are conducting a series of studies to collect basic population data to assist us in managing this plant at our experimental test facility. Four plots were established within three field populations of this species, and within one population of the common *Blepharizonia plumosa ssp. viscida*. Demographic data was collected on marked individuals. A common garden experiment was conducted on achenes (seeds) collected from each of the four field populations. Field survivorship ranged from 1 to 50% for the rare tarplant, and was zero for the common tarplant. In the common garden experiment, germination of rare tarplant disk achenes ranged from 50 to 78%, but ray achene germination was below 4%. In the common tarplant, disk and ray achene germination was 23% and 7.2%, respectively. Nearly three times more viable achenes were produced by the common tarplants than the rare tarplants. Although field survivorship was low for the common tarplant, the garden experiment suggest fecundity of the common tarplant to exceed that of the rare tarplant. Work performed under the auspices of the U. S. Department of Energy by Lawrence Livermore National Laboratory under Contract W-7405-Eng-48.

Keywords: tarplant, *Blepharizonia plumosa*

Biography

Tina M. Carlsen is an environmental scientist in the Environmental Restoration Division. Her research interests include the ecotoxicology of solvents, radionuclides and metals, as well as the management and restoration of rare and endangered plant species. Dr. Carlsen is also currently working on a project to develop technologies to rapidly determine the viability of biological warfare agents. Dr. Carlsen has a BA in Biology from California State University, Stanislaus, an MS in Environmental Management from the University of San Francisco, and a PhD in Ecology from the University of California, Davis.

Preserving Information at LLNL

Chelle Clements, David Anderson, Eric Frerking, and Bruce Lownsbery, Nuclear Weapons Information Project

Information preservation and use is a key part of maintaining a safe and reliable stockpile. Our experts are retiring, their data is boxed-up, stored and sometimes lost, old digital information is also lost due to irretrievable formats, and historical documents and notes are frequently put in a circular file or "File 13." The Nuclear Weapons Information Project (NWIP) mission is to provide continuing and appropriate access to Defense and Nuclear Technology data, knowledge and expertise. The Nuclear Weapons Information Base (NWIB) is based on Web Technology. It allows for many types of powerful searches, is organized for quick retrieval of information, is quick and easy to use, and is fast – but uses inexpensive hardware. The term "archiving" connotes inactive records – the NWIP goal is a living and active library/archive with better access than users have ever had before.

Keywords: Archiving Stockpile Stewardship

Biography

Chelle Clements is a Senior Scientific Technologist in Defense and Nuclear Technology's "B Division." She has an Associate in Applied Science in Environmental Science Technology from Northern Virginia Community College and is currently working on a Bachelor's in Information Systems Management at the University of San Francisco. Her work with the Nuclear Weapons Information Project involves researching, collecting, preserving and presenting information from all aspects of weapons design and testing.

High Photon Energy K-shell X-ray Sources on the Z Accelerator

C.A. Coverdale, C. Deeney, R.B. Spielman, T.J. Nash, M.R. Douglas (Sandia National Labs, Albuquerque, NM) , J. Davis, K.G. Whitney, J.P. Apruzese, J.W. Thornhill, and R.C. Clark (Naval Research Labs, Washington D.C.), F. Davies and E. Smith (Ktech Corporation, Albuquerque, NM) R. Schneider (DSWA/EST, Alexandria, VA)

Z-pinches have always been efficient sources of many tens of kilojoules of x-rays for photon energies from 1 to 3 keV. The advent of the 20-MA Z accelerator at SNL has enabled the scaling of Z-pinch plasma radiation sources to the 4- to 7-keV photon energy range with outputs exceeding 100 kJ of x-rays, opening up opportunities for both radiation-material and atomic physics studies. On the Z generator, the implosion of 2-mg/cm masses of titanium to velocities between 70 and 90 cm/ms have produced 2-mm-diameter plasmas with electron temperatures of 3.0 keV. By varying the initial wire array diameter and wire number, the x-ray emissions were maximized with 120 kJ being radiated from the K-shell (4.8 keV) out of a total x-ray yield of 1.2 MJ. Additional experiments using nickel-clad titanium wires (15% nickel by mass) have been performed to optimize these loads and improve the spectral fidelity. The measured outputs and plasma parameters agree well with one- and two-dimensional radiation- magneto-hydrodynamic calculations of these implosions. By using higher velocity implosions, we have also produced up to 65 kJ of 6.7 keV x-rays from stainless steel wire arrays and have formed plasmas with temperatures of 3.7 keV at densities greater than 0.01 g/c^3. In this paper, the experimental results along with spectroscopic data and calculations will be presented.

Keywords: plasma physics, magnetohydrodynamics, spectroscopy

Biography

Christine A. Coverdale received her Ph.D. from the University of California, Davis in the Department of Applied Sciences in 1995. The thesis work, entitled "The Interaction of Intense Subpicosecond Laser Pulses with Underdense Plasmas," was performed at LLNL in Laser Program. Upon completion of her thesis, she went to work at Physics International, where she worked on the development of z-pinch x-ray sources on pulsed power machines, particularly in the areas of high fidelity sources, and long implosion time z-pinches. She joined Sandia National Labs in 1997, where she works in the Materials Radiation Science Department. Much of her work has centered around the Hostile Environment Certification of the MC4380, a neutron generator, and the development of x-ray sources (both Bremstrahlung and z-pinch) for this project. Her long implosion time z-pinch work has continued on Saturn, and she has been involved in the development of high photon energy z-pinch sources on the Z accelerator as well.

Material Flow for the National Ignition Facility

Janice Girven

The National Ignition Facility (NIF) is currently under design and construction at Lawrence Livermore National Laboratory. When completed it will be the world's biggest laser. The NIF's large optics will be assembled into modules, known as line replaceable units (LRUs). There will be approximately 41 different LRUs that need to be delivered and removed on a "just in time" basis.

The NIF has an aggressive schedule for initial installation and activation of the multipass, 192-beam, high-power neodymium-glass laser. Timing is a crucial part of this project. As each area in the building is completed, the necessary components need to be ready to install. When the laser begins the operation phase, components will need to be replaced. Those replacements must be standing by, ready to insert. Many groups will need access to different areas of the building during that time. Coordinating traffic control is critical for meeting schedules and minimizing downtime on the laser.

This poster portrays the material flow for the NIF project. The Material Flow team is tasked with developing a flow process that incorporates the physical flow of LRUs between all the required facilities, as well as defining storage space for the support equipment for both the start-up and operations phases of the project. To accomplish theses tasks we utilize existing facility drawings and models to generate new layouts, models and charts that define the storage, maintenance, and physical flow between the supporting facilities. We also incorporate the master schedule in our work to depict available access times of designated storage areas in the building. Some of the many methods and tools that we use to visualize our design concepts are Pro-E, ACAD, Illustrator, Excel, PowerPoint, PhotoShop, Trispectives, Iron CAD, 2D magnetic whiteboard models, animation, Winflow, and Intergraph models.

Biography

Janice Girven is a mechanical designer on the NIF project who specializes in Industrial Design. She is matrixed from the Plant Engineering Industrial Electronics/Electrical Engineering department to Lasers ICF Program Electrical Design Drafting and Coordination, then matrixed to the NIF Operations group. The skills she has developed from her diverse background aid her in her role as a Designer for Material Flow. In this capacity she helps others to visualize problems, design concepts or solutions. These skills include ergonomics, problem solving, animation, 3D modeling, model making visualization, scheduling, and graphics. She serves as the Chairperson of the LLNL ACAD Users Group and volunteers for both

Expanding Your Horizons and the Science Fair by National Organization of Black Chemists and Engineers. Additionally she participates in the following organizations: LLNL Women's Association, LLNL 3D Studio Users Group.

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The Integrated Molecular Analysis of Genomes and their Expression (I.M.A.G.E.) Consortium: A shared resource

F.S. Hill[1], L. Mila[1], C. Prange[1], and G. Lennon[2]., [1]Lawrence Livermore National Laboratory, [2]Gene Logic, Inc., Columbia, MD

The world of biotechnology has entered into an era of great developments and discoveries. With this progress it is evident that more resources are needed to further increase the rate at which information is provided to researchers. With this in mind the I.M.A.G.E. Consortium was started in 1993 as a collaborative effort by four academic scientists with the goal of developing high-quality, shared arrays of cDNA libraries to facilitate the discovery of new genes. These clones are available royalty-free to anyone who agrees to place all sequence, map, and expression data into the public domain. Since cDNA libraries generated from different tissues have many of the same expressed genes it is most advantageous to share information from participating laboratories and minimize redundant work. Prior to the formation of the public resources of I.M.A.G.E. such a coordination of research was not possible. In addition, I.M.A.G.E. and the National Cancer Institute are in a sequencing collaboration as part of the Cancer Genome Anatomy Project to gain information on genes implicated in major cancers. Currently, the I.M.A.G.E. cDNA collection consists of over 1.8 million arrayed clones from over 200 cDNA libraries representing human and mouse tissues. Sequences derived from I.M.A.G.E. clones make up 75% of all ESTs in dbEST, making it the world's largest public cDNA collection. Future goals include the re-array of unique clones which will ultimately contain a representative cDNA from each gene in the genome, increased use of full-length libraries, and libraries created from other model organisms. All of these factors will maximize gene discovery and lead to new therapies and drugs to treat genetic diseases. Work performed under the auspices of the U.S. Department of Energy by the Lawrence Livermore National Laboratory under contract number W-7405-ENG-48.

Keywords: biology, gene expression, cDNAs

Biography

Francesca S. Hill and Lee Anne Mila are Biomedical Scientists in the Biology and Biotechnology Research Program. Francesca received her B. S. in Genetics from the University of California, Berkeley in 1988, and certification as a Clinical Laboratory Specialist in Cytogenetics in 1989. She began working at LLNL in 1992 in the area of biophysics, and then became part of the I.M.A.G.E. Consortium in 1997. Lee Anne received her B. S. in Biology from California State University, Hayward in 1997. She became part of the I.M.A.G.E. Consortium in 1997.

Bottom Loading Delivery System of Flashlamp Cassettes for the National Ignition Facility

Kelly Holm (with S. Bahowick and M. Simmons)

The National Ignition Facility (NIF) currently under design and construction at the Lawrence Livermore National Laboratory is a billion-dollar, multipurpose laser consisting of 192 laser beams that will direct their energy on a pea-sized capsule containing hydrogen isotopes. The NIF will serve vital national security purposes, further our understanding of fusion energy, and enable researchers to explore scientific conditions similar to those found at the center of the sun. The NIF's large optics will be the largest ever assembled in a cleanroom environment. Some of the assemblies will weigh as much as 3,000 lbs.

The NIF has an aggressive schedule for initial installation and activation of the neodymium-glass laser. The optics will be assembled and aligned into modules, known as line replaceable units (LRUs), in the NIF Optics Assembly Building (OAB). The OAB is adjacent to the Laser and Target Area Building (LTAB), where the optics will be installed. To accommodate this schedule and maintain operations, the delivery system for these LRUs must maintain the strict cleanliness and precise alignment of the LRUs. The flashlamp cassette LRUs will be the first LRUs to be installed into the LTAB. NIF will require a total of 1152 flashlamp cassettes consisting of three designs. In addition to responding to the normal rate of failure of the flashlamp cassettes, the canister delivery system will be capable of removing flashlamp cassettes for inspection of the lamps and the connectors, and for implementing upgrades to the LRU.

This poster exhibits the delivery system used to transport the flashlamp cassette LRU from the OAB to its correct location in the LTAB and its insertion into the frame assembly unit (FAU). To ensure that the NIF installation and repair rate schedule is maintained, the delivery system is required to transport three flashlamp cassettes simultaneously, and to insert one cassette at a time. The delivery system will also remove one cassette at a time, up to a total of three, then transport them to the OAB to begin the refurbishment process. The canister used for transportation will maintain the controlled environment of the FAU and the class 1000 cleanliness requirements during installation and removal. The entire process of insertion or removal is done automatically through precise positioning. The design process uses known loads and deflections, and well understood clearances.

Biography

Kelly Holm is a Mechanical Designer for the Lawrence Livermore National Laboratory (LLNL). She is currently the lead designer for the Bottom Loading Delivery System Flashlamp Cassette Canister for the National Ignition Facility (NIF) Transport and Handling group. Her responsibilities include the design of the canister and the mechanical systems required to transport, insert, and remove Flashlamp Cassettes from the NIF structure. Previously, Kelly was a lead designer for the Heavy Ion Fusion group working on the development of the small recirculator project. She was also a lead designer in Nuclear Test Engineering Division, focusing on nuclear weapons device canister design.

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Bottom Loading Delivery System for the National Ignition Facility

Linda Leonardini (with S. Bahowick)

The National Ignition Facility (NIF), a $1.2 billion laser facility, is the world's largest laser to date (the size of a football stadium). It is being constructed at Lawrence Livermore National Laboratory (LLNL), but is a joint effort by LLNL, Los Alamos, Sandia, and the University of Rochester's Laboratory for Lasers Energetics. The purpose of the NIF is to substantiate theories regarding fusion ignition. This will be obtained by delivering huge amounts of energy through 192 beamlines each approximately 4 feet in diameter upon a target the size of a BB. Fusion ignition creates conditions similar to those caused by the sun and nuclear weapons. Not only will the NIF help maintain the U.S. stockpile without nuclear testing, but it will also provide a locale for valuable energy research.

The NIF will contain 33,000 ft^2 of highly polished precision optics. The large optics will be assembled into modules known as Line Replaceable Units (LRUs). The LRUs will be delivered to the OAB (Optics Assembly Building) where they will be cleaned and assembled. The Transport and Handling group is responsible for delivering these LRUs from the OAB to their positions in the LTAB, switchyard, and target bay areas. Many of the delivery systems are automated to make transport and handling of the LRUs more reliable, cleaner, and safer.

The bottom loaded LRUs are transported and handled using an automated delivery system. The delivery system consists of a canister and its mechanisms and controls, as well as an automatically guided vehicle. The canister is depicted in this poster. The LRUs are transported in the canister. There are three canister designs–Universal, Flashlamp, and Amplifier Cassette. The Universal Canister will be capable of loading eight different types of LRUs, the three types of Flashlamp Canisters, and the two types of Amplifier Cassette Canisters. The optical elements of the LRUs must maintain a Level 50 surface cleanliness during transportation and handling. This Level will be maintained by carefully controling materials, using a design that minimalizes particulation, and the use of a nitrogen recirculation system, in which airborne contaminants are collected on high-efficiency filters. The repeatability of position of all the components in the canister will need to stay within a specified allocation of the capture zone to ensure the success of the removal and insertion of the LRUs. Prototyping the bottom loading canister will ensure that our designs work while meeting our cleanliness requirements. The bottom loading delivery system will be capable of insertions and removals at levels of 11 feet and 19 feet, the nominal elevation from the floor to the beamline structure.

Biography

Linda Leonardini is a Senior Mechanical Technologist for Lawrence Livermore National Laboratory (LLNL). She is currently a technician for the Bottom Loading Delivery System for the National Ignition Facility (NIF) Transport and Handling group. Her responsibilities include designing, modifying, fabricating, installing, and aligning the various components of the canister, and testing for cleanliness. Previously, Linda was a Senior I Machinist for Manufacturing and Materials Engineering Division (MMED 1990-1998). She completed her machinist apprenticeship at LLNL in 1990 and in January 1998 made the transition from machinist to technologist. She has a Bachelor of Science Degree as well as an AA in drafting and machine tool technology.

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Defense Technology Fights Cancer: PEREGRINE Moves To The Clinic

Sarita S. May

The goal of the PEREGRINE program is to improve the effectiveness of radiation therapy in the treatment of cancer by ensuring widespread and rapid distribution of this technology to the approximately 2,000 treatment centers in the United States that use radiation therapy. In order for PEREGRINE to have the highest impact on the maximum number of patients, our program has had the following objectives:

- Demonstrate that PEREGRINE Monte Carlo dose calculations are fast and accurate
- Design an affordable package that is compatible with existing treatment systems
- Address intellectual property and copyright issues
- Prepare validation and verification package for FDA submission
- Develop and implement an effective licensing strategy

Through these activities we believe we can fulfill the expectations of the medical community now and continue to advance the field of radiation therapy well into the 21st century. We report our progress in achieving these goals and our plans to field PEREGRINE dose calculation systems in hospitals across the United States in 1999.

Keywords: peregrine, radiation, cancer

Biography

Sarita May, the PEREGRINE assistant program manager, is responsible for External and Regulatory Affairs for the PEREGRINE program in the Physics and Space Technology Directorate. Sarita studied International Affairs and Aeronautical Science and later earned her MBA from Johns Hopkins University. Sarita served as a Captain in the Army for Military Intelligence and has been program manager and executive officer on several large defense programs in industry, the Pentagon and at Lawrence Livermore. Sarita manages all activities associated with the Food and Drug submission for PEREGRINE and for PEREGRINE activities with scientific, government, medical and industrial communities.

DNA Manipulation with Dielectrophoretic Forces

Robin Miles, Amy Wang, Kerry Bettencourt, Shanavaz Nasarabadi

The ability to transport, sort, and characterize biomolecules is essential to many biomedical fields, such as medical diagnostics, cytology, and genetics. Noncontact methods of biomolecule manipulation are especially attractive because force fields can be generated from a remote source. In this work, we discuss the manipulation of deoxyribonucleic acid (DNA) using electric fields. DNA molecules are especially conducive to manipulation with electrical forces because they carry a net negative charged. A uniform DC field will cause DNA molecules to move towards the positive electrode (a mechanism commonly used in electrophoresis). Dielectrophoresis is a technique of manipulating biomolecules in a nonuniform electric field. The field induces a dipole in the molecule, and the gradient of the field causes the molecule to migrate either towards or away from the regions of high field strength. The direction is dependent upon the dielectric and conductive properties of the particle with respect to the medium in which it is suspended. Hence, DEP forces can also be used as a tool for sorting biomolecules based on their electrical properties.

We are particularly interested in studying to what degree we can use dielectrophoresis to trap small (or short) DNA segments. The DEP force exerted on a molecule is a function of its length. Consequently entrapment of small molecules requires higher electric fields to produce a force sufficiently large enough to overcome drag and random thermal forces within the medium. With micromachining technology we can photolithographically pattern features of similar size scale to the DNA molecules, reducing the voltage necessary to achieve a given electric field. Using platinum electrodes patterned on a glass substrate, we have demonstrated the ability to trap DNA molecules as small as 8.4 kbp at the edges of 50-µm-wide electrodes across a 30-mm gap. We have also modeled the DEP forces produced by our planar electrode designs using a finite element simulator, MaxwellTM. These simulations indicate that we will be able to trap even shorter DNA segments using more closely spaced electrodes.

Keywords: DNA, dielectrophoresis, MEMS, micromachining, particle manipulation

Biography

Robin Miles received a BSME from MIT, a MSME from Stanford University and a MBA from UC Berkeley. She most recently worked at Redwood Microsystems where, amongst other tasks, she was the program manager for the Flow-istor flow controller product. She joined LLNL in 1997 where she is the principal investigator on a number of sample preparation projects related to biological testing for pathogen detection.

Pollution prevention projects*

Sabre Coleman, Katharine Gabor, and Barbara Nisbet

Pollution prevention and waste minimization is included as a Performance Measure within Appendix B of Contract 48, and there are several federal Executive Orders and State of California regulations that outline requirements for waste minimization and pollution prevention. The Pollution Prevention Group (PPG) within the Environmental Protection Department at LLNL identifies opportunities to reduce pollution, provides technical guidance on pollution prevention projects, and selects and designs waste-reduction technologies and equipment In 1997, with efforts by PPG and other LLNL staff, the Laboratory was awarded the national DOE award for its achievement in solid waste recycling of construction and demolition debris.

PPG conducts pollution prevention opportunity assessments, which may be followed by a bid to procure funds for implementing the high return on investment projects. We will outline the process used conduct a pollution prevention opportunity assessment and return on investment calculations.

We will present recent pollution prevention projects that showcase the effectiveness and cost of alternative chemicals and technologies. Included in the presentation shall be information on solid waste recycling, digital photography, and alternatives to solvents including ultrasonic cleaning and aqueous parts washers. We will also present quantitative data on the successful reduction of waste reduction at LLNL.

*Work performed under the auspices of the U.S. Department of Energy by the Lawrence Livermore National Laboratory under contract number W-7405-ENG-48.

Keywords: pollution prevention, computer tools, waste minimization

Biography

Barbara Nisbet is a chemist in the Pollution Prevention Group (PPG) of the Environmental Protection Department. She received her B.A. in Microbiology from the University of Montana and her M.S. in Bacteriology chemistry from Washington State University in 1968. She has worked at the Primate Center in Davis, Cutter Laboratories in Berkeley, and Oak Knoll Naval Base in Oakland, CA. She spent 6 years in the Biology and Biotechnology Department at LLNL in the Cytochemistry section. In 1989, she joined the Environmental Protection Department as a chemist in the Hazardous Waste Management Division. Recent assignments include being the pollution prevention specialist for ES&H Team 1, lead analyst for a study of the top 20 chemicals and trade products used at LLNL, and the manager for waste generation data quality.

Study of Protein Non-Covalent Interactions by Electrospray Ionization Mass Spectrometry

M. C. Prieto[1], R. Whittal[2], R. Balhorn[1], and A. L. Burlingame[2], [1]Lawrence Livermore National Laboratory, [2]Mass Spectrometry Facility, University of California, San Francisco

Electrospray, a very "soft" ionization technique, and mass spectrometry have recently been applied to the study of intramolecular (tertiary structure in proteins) and intermolecular (protein-ligand) interactions in biochemical systems. This low energy ionization process does not tend to fragment molecules, therefore conserving the structure of the protein or the protein-ligand complex.

The Clostridial neurotoxins, botulinum and tetanus, are believed to gain entry into neural cells by protein recognition of specific binding sites. The system under study is a fragment of the tetanus toxin and the ganglioside it binds to on the cell surface. The research goal is to locate the active recognition site of the toxin. Mutation of this binding site could produce a protein which is structurally similar to the toxin, but unable to enter neural cells. The ultimate goal of this type of research is the development of safer and more efficient vaccines. The basic research aspect of this study will provide an understanding of protein-protein interactions, a process critical for normal cell function and one frequently exploited by bacteria and viruses to facilitate their entrance into cells.

Keywords: biological mass spectrometry, electrospray, protein-protein interactions, tetanus toxin

Biography

Maria C. Prieto is a physical chemist with the Chemistry & Material Sciences directorate, matrixed to the Strategic System Support Program (D&NT). She obtained a B.S. degree in Chemistry from the University of Puerto Rico, an M. S. degree in Marine Sciences from the University of Puerto Rico, and a Ph.D. in Chemistry from the University of California, Davis. She then spent three years as a post-doctoral fellow at LLNL, working on the characterization of an LLNL designed, miniature Fourier transform mass spectrometer. She has just started work in the area of biological mass spectrometry, a collaboration between the Biology and Biotechnology Research program and the University of California, San Francisco.

Polarized Light Propagation in Scattering Media

Vanitha Sankaran, Luiz Da Silva and Duncan J. Maitland,
Medical Technology Program

Imaging through scattering media relies on the discrimination of forward or weakly scattered photons, which have traveled a direct path through the medium, from highly scattered photons, which have traveled a more circuitous path through the medium. The polarization state of light is one possible discrimination criterion that will allow us to image structures within highly scattering tissue. As photons travel through the tissue, unscattered and weakly scattered photons retain their initial polarization whereas highly scattered photons become depolarized. We measured with 20 mm of spatial resolution the degree of linear and circular polarization for both polystyrene spheres, and, for the first time, the densely packed aspherical scatterers found in fat and artery. These data provides two types of information: 1) the correlation between polarization and weakly scattered photons, and 2) the number of scattering events needed to depolarize linearly and circularly polarized light. The results indicate the promise for using polarized light imaging to detect objects embedded within highly scattering tissue.

Keywords: degree of polarization, multiple scattering, ballistic photons

Biography

Vanitha Sankaran is a graduate student in the Medical Technology Program at Lawrence Livermore National Laboratory. She received her B.S. degree in Optical Engineering in 1994 from the Univesity of Arizona and her M.S. degree in Biomedical Engineering in 1996 from Northwestern University, where she is currently a Ph.D. student. She conducts research into using polarization for tissue characterization and has authored scientific publications and conference proceedings.

The Development of a New Physics Simulation Code Package for ICF Experiments

*Linda M. Stuart**

A new three-dimensional large-scale physics simulation code for inertial confinement fusion (ICF) applications is currently under development at Lawrence Livermore National Laboratory (LLNL). The name of the code is Kull, and it will be used as a tool to simulate ICF experiments such as those which will be performed at the National Ignition Facility (NIF), currently under construction at LLNL. This innovative code is written in an object-oriented manner and has a Python interface, which allows the user to exercise considerable control when running the code. The code is being optimized for performance using various techniques such as multiple processors, domain decomposition, and threads. We will give a status report on this project with an emphasis on the physics including thermonuclear burn, hydrodynamics, and various modes of radiation transport.

Keywords: fusion, transport, inertial confinement

Biography

Linda Stuart is a nuclear physicist currently working on code development for physics simulations. She has a B.A. in Physics and Mathematics from Ohio Wesleyan University, and received her Ph.D. from the University of California, Davis in 1992. She spent five years as a post-doctoral research associate at the Stanford Linear Accelerator Center working on a series of high-energy polarized nucleon structure experiments. She is currently working for the Kull project at LLNL where she is responsible for the thermonuclear burn and particle transport Monte Carlo.

This work was performed under the auspices of the U.S. Department of Energy by the Lawrence Livermore National Laboratory under Contract W-7405-Eng-48.

*Representing the Kull project.

Ergonomics Research at LLNL

Pat Tittiranonda, PhD, The Ergonomics / Biomechanics Laboratory

The Ergonomics/Biomechanics Testing Laboratory at the Lawrence Livermore National Laboratory specializes in the development of instrumentation for ergonomic exposure assessments. It is outfitted with three-dimensional motion analysis equipment, electromyography, electrogoniometry, a sensor based hand tracking system, an image processing facilities as well as instrumentation for measuring back biomechanics. The laboratory has been established as a DOE Ergonomics Testing Center for Small Businesses, which encourages small businesses to tap into our technical capabilities. In addition, we have active collaborations with the University of California at Berkeley and San Francisco, the University of Michigan Center for Ergonomics and the National Institute of Working Life, Sweden.

Application - Motion analysis: Biomechanical assessments of upper extremity and low back disorders risks due to highly repetitive jobs such as computer work or physically demanding work such as material handling tasks can be accomplished with dynamic, three-dimensional evaluation of joint motion. Alternative tools such as split geometry keyboards can be evaluated to determine if extreme hand and arm positions, which lead to carpal tunnel syndrome, are minimized with their use. When tendons are inflamed, pressure is created within the carpal canal, allowing the median nerve to be pinched, which results in carpal tunnel syndrome.

Our motion analysis systems have additional applications for the facilitation of workplace redesign to reduce the risk of work-related musculoskeletal disorders. One such system is the sensor-based hand tracking system, which is used to measure wrist joint motion. It has been used to measure wrist angles during keyboard operation as well as other hand intensive tasks, such as microelectronic assembly.

Input Devices Interventional Studies

We conducted the first long term clinical trial of alternatively designed keyboards comparing clinical and biomechanical function among the workers diagnosed with computer-related MSDs during use of three alternative geometry keyboards in comparison to the flat keyboard.

A standardized physical examination and clinical assessments of upper limb pain and hand function were carried out prior to the keyboard intervention, 6, 12, 18, and 24 weeks after heavy keyboard use. In addition, a series of biomechanical assessments were carried out to correlate MSD risk factor reduction to clinical improvement. Several ergonomic exposure assessment tools such as the instrumented keyboard were developed to measure fingertip impact force during typing. A 3D video motion analysis system, composed of five high-resolution infrared cameras, was also used to compare the changes in dynamic wrist and upper limb motion between the flat and alternative keyboards.

Preliminary findings indicated that over three months, overall pain and functional status among employees with MSDs improved when using all alternative geometry keyboards, with significant improvement observed for the described design. Following six months of keyboard use, a positive trend toward improvement in pain severity and hand function was demonstrated in the fixed split keyboard group and to a lesser extent the adjustable split keyboard compared to the linear geometry keyboard. This study provides evidence the some alternative geometry keyboards can be useful to some employees suffering from work-related MSDs in reducing symptom severity and improving functional status.

We are continuing our investigations into the health effects of intensive pointing device usage in graphic illustration, computer programming, and accounting work. In modern computing environments, where pointing device usage accounts for up to 65% of the time spent at the computer, it is important to design products which are "biomechanically rational." We are collaborating with the University of Michigan Center for Ergonomics and the University of California Ergonomics Program to design alternative pointing devices using data from workplace ergonomic studies, clinical biomechanics, and computational modeling.

Keywords: ergonomics

Biography

Dr. Tittiranonda is currently a Post-Doctoral Fellow and Principal Investigator for a workplace investigation of alternative input devices on computer users. In 1997, she was awarded a research grant to develop computer input devices which will reduce the risk of musculoskeletal injury. Additionally, she has received several grants to study long-term effects of alternative input devices in the workplace. Dr. Tittiranonda is actively involved with the Ergonomic Task Force at LLNL, which she co-chairs.

Dr. Tittiranonda received her B.S. in Medical Biophysics in 1989 and a Masters in Public Health in 1990, both from the University of California, Berkeley. She received her Ph.D. in Environmental Health Sciences with an emphasis in Ergonomics from the University of California, Berkeley.

Ultrasonic Immunoassay for Detection of Breast Cancer Antigens*

Amy Wang[1], Radwan Kiwan[2], Richard White[3], [1]Lawrence Livermore National Laboratory, [2]Cancer Research Fund of Contra Costa, [3]University of California, Berkeley

Patients with active breast cancer exhibit elevated blood serum levels of breast epithelial mucin antigens (BrE-Ags). Currently, serum levels of BrE-Ags in breast cancer patients are monitored during follow-up of surgery or chemotherapy treatment, where a rise in blood antigen levels indicates the presence of residual tumors.

We present a silicon-micromachined immunosensor package that has been designed to detect a specific breast epithelial mucin antigen, non-penetrating glycoprotein (NPGP). We couple an acoustic sensor, the flexural plate wave (FPW) device, with a novel mass-amplifying label that increases sensor signal from that of previous acoustic immunoassays. The use of a gravimetric immunoassay provides an alternative to radioimmunoassay, eliminating the need for radioactive labels that require costly disposal. In addition to gravimetric sensing, the FPW device is also capable of providing a source of ultrasonic agitation, which results in localized mixing near the active immunoglobulin binding area of the device. We have observed increased antibody binding using ultrasonic agitation during immunoglobulin incubation periods. Consequently, with ultrasonic agitation, we are able to reduce the length of time necessary to complete the immunoassay, and also affect the amount of antibody binding.

Keywords: acoustic, breast cancer, immunosensor, ultrasonic, MEMS, micromachining

Biography

Amy Wang is an electrical engineer in the Center for Microtechnology at LLNL. She is also an adjunct professor in the Department of Applied Science at the University of California at Davis. Her research interests include the application of micro electro-mechanical systems (MEMS) to biological and medical applications. Amy received her Ph. D. from the University of California at Berkeley.

* This work was performed at the University of California at Berkeley and the Cancer Research Fund of Contra Costa.

Thermal Power Supply Poster Session

Elizabeth C. Wichman, M. C. (Chrisma) Jackson

Alternate power sources are an area of continual research. In the world of stand-alone sensor platforms for Nuclear Material Monitoring, the standard power sources are batteries, which have a very limited lifetime in comparison to the other components of the sensors. If the lifetime of the power source can be extended, thus extending the lifetime of the sensor platform, the lifecycle costs of monitoring material long-term can be greatly reduced. This experiment was done to prove the feasibility of powering an electronic sensor platform (ESP) using the waste heat generated by a standard light bulb. The electronic sensor pack was powered for 2.5 weeks by the heat of a 75-W light bulb, and could have operated indefinitely in a controlled environment. Further refinements of the power supply circuit and thermal interfaces have evolved the system to the point where the ESP can run on 5-W of heat or less. These circuits could conceivably be used to power ESP's using only the decay heat from the nuclear materials they are monitoring. Further research is ongoing to mate the power supply design to a container design.

Keywords: Material Monitoring, Thermal Power, Sensor

Biographies:

Beth Wichman earned her BS in Electrical Engineering from Cornell University. She now works for Sandia National Labs Department 2221 as a Member of Technical Staff on the Material Monitoring System.

Marian C. (Chrisma) Jackson graduated from Texas A&M University in College Station, Texas with a Bachelor of Science in Mechanical Engineering in 1995. She continued her studies at Texas A&M and received her M.S. in Mechanical Engineering in 1998 and is currently employed at Sandia National Laboratory in Livermore, California as a Member of the Technical Staff.

Developing New Strategies for Prostate Cancer Radiation Therapy with PEREGRINE

D. Jay J. Wieczorek

Prostate cancer is the most prevalent form of cancer in American men today with over 300,000 newly diagnosed cases last year. Radiation therapy, the single most effective agent in the treatment of prostate cancer, was used on 100,000 Americans patients last year. The goal of this treatment is to irradiate the prostate while sparing the surrounding normal tissue to avoid side effects such as impotence, incontinence, and rectal bleeding. Current radiation therapy treatment planning systems do not accurately model dose delivered because of the presence of tissue heterogeneities such as the pelvis. Using the highly accurate PEREGRINE dose calculation system, developed at the Lawrence Livermore National Laboratory, we have uncovered systematic errors in present treatment planning techniques. A comparison of dose calculations for various prostate cancer treatment techniques using PEREGRINE and a standard treatment planning system has been completed, and new strategies to improve treatment are being developed.

Keywords: peregrine, radiation, cancer

Biography

D. Jay J. Wieczorek, Ph.D. is a post-Doctoral fellow at the Department of Radiation Oncology of the University of California-San Francisco. She received her Bachelor of Science degree in Physics from the University of the Philippines. She has a Master of Science degree in Medical Physics from the University of Missouri-Columbia and a Doctor of Philosophy from the Georgia Institute of Technology. She is currently doing collaboration studies with the PEREGRINE program of Lawrence Livermore, concentrating on developing new and more effective radiation treatment strategies for cancers of the prostate and the breast.

Precision Assembly and Alignment of Large Optic Modules for the National Ignition Facility

Ladona Willis

The National Ignition Facility (NIF) is currently under design and construction at Lawrence Livermore National Laboratory. When completed it will be the largest laser in the world. It will contain 33,000 ft^2 of highly polished precision optics equipment. The NIF large optics assemblies require special handling during assembly and alignment, which requires a class 100 clean room. Some of the assemblies will weigh up to 3000 lbs.

The Optics Assembly Building (OAB) is a clean room specially designed to meet the needs of these assemblies. Every piece of equipment that is either designed or purchased off the shelf has to meet rigorous cleanliness standards or be modified to accommodate these standards. When equipment is chosen, the weight of the LRUs also must be considered for versatility and maneuverability. Every piece of handling equipment must also meet requirements for acceptable vibration levels because vibration introduced to the LRUs can mis-align or permanently damage them. To ensure that these standards of cleanliness and vibration are met, the equipment is rigorously tested.

This poster shows some of the typical vibration-testing equipment used and some of the handling equipment for the LRUs that will be tested for cleanliness and vibration standards.

Biography

Ladona Willis is a Senior Mechanical Technician at Lawrence Livermore National Laboratory working on the NIF project. She is assigned to the Optics Assembly Area, where her responsibilities are to manufacture, assemble, and test prototype designs for optics assembly equipment. Testing of this equipment includes mechanical operation and vibration analysis. Her background is in machining. She completed the Laboratory's four-year Machinist Apprenticeship, receiving her Journeyman Machinist certification in 1994. She is also a member of the American Society for Quality.

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Exhibitors

Women Chemists Committee California Section of the American Chemical Society

Mary F. Singleton

The American Chemical Society with 160,000 members claims to be the largest professional organization in the world, and the Women Chemists Committee (WCC) in the California Section is one of the most active local WCCs in the country—out of 187 sections. We focus on educational outreach to children, young women, graduate and under-graduate chemistry students,and women working in the chemical professions. We act as a network for women in the chemical professions. We meet at least four times a year for social and scientific programs, usually collaborating in our programming with the Association of Women in Science (AWIS), Iota Sigma Pi (honor society for women in chemistry), and a number of other women's organizations. Many of their members are officers in the California Section, and they participate in committees at the national level of the American Chemical Society. This is a dynamic group of women who practice and promote careers in chemistry. We will be heavily involved with National Chemistry Week from November 1st to 7th giving hands-on demonstrations and lectures to parent-student groups, at local libraries, and at places of business.

Videoteleconference Center (VTC)

Miriam Alford, Director - Lawrence Livermore Television Network

The Videoteleconference Center (VTC) at Lawrence Livermore National Laboratory is a valuable resource to the Lab-wide community. This facility electronically connects Laboratory representatives with a variety of DOE, DoD, UC, and private industry sites. Both national and international connections can be made with high-level audio and video clarity.

Characterized as "virtual travel," the cost savings in off-setting travel dollars can be significant. The other plus is for the traveler: no hassles making airline connections, no problems with jet lag, and no days lost traveling to and from a far site.

To demonstrate videoteleconference capabilities, the representatives of the VTC will connection to Los Alamos and LLNL live from the WTPS main ballroom.

Counterintelligence at LLNL: The Security Awareness for Employees (SAFE) Program

Corinne Berendt

Security Awareness for Employees is the Lab's counterintelligence program. Our purpose is to identify and counter foreign intelligence threats against Laboratory personnel, information, and technologies. Our program also is concerned with the growing threat of terrorism against U.S. interests and the protection of sensitive unclassified information critical to LLNL's business with the private sector. One goal of the SAFE Program is to raise the awareness of all LLNL employees to counterintelligence issues, without impeding Laboratory programs' goals and requirements. We do this in large part through interviews conducted by counterintelligence analysts with employees who have had contacts with nationals of sensitive* countries, whether by virtue of travel or by hosting a foreign visitor at the Laboratory. We also advise employees and managers, as needed, regarding the intelligence threat to Laboratory programs and personnel; and invite speakers from the intelligence community to speak to Laboratory audiences on espionage-related topics.

The LLNL Director's Office established the SAFE Program in January 1986 in response to a presidential directive that required all U.S. government agencies to establish their own security awareness programs. The impetus for this directive was the identification of numerous cases during the 1980s of U.S. citizens spying against the United States. The President and Congress then, as now, viewed espionage as a serious threat to national security.

Key Words: Counterintelligence, intelligence, national security, SAFE, spying, threat, travel.

Biography

Corinne Berendt is an Executive Staff Member for the Security Awareness For Employees (SAFE) at Lawrence Livermore National Laboratory (LLNL). She began her LLNL career in July 1992, following ten years of intelligence work at the Central Intelligence Agency (CIA), first as a political/economic analyst and later as an intelligence officer in the clandestine service. In her assignments in Washington, D.C. and the San Francisco area, she specialized in Russian-Northern European affairs and Japanese high technology industries. Ms. Berendt holds degrees in international studies from Wellesley College and The George Washington University. She also completed a certificate program in Environmental Studies at U.C. Berkeley.

* The Department of Energy maintains a Sensitive Country List, which identifies countries who are judged to threaten U.S. national security interests due to their activities relating to nuclear proliferation, biological or chemical weapons development, regional instability, and/or support for terrorism.

Sigma Xi

Dorothy Bishop

Sigma Xi is an internationally established scientific research society whose mission includes fostering worldwide interactions of science and technology with society, encouraging appreciation and support of original work in science and technology, and honoring scientific and engineering accomplishments. LLNL has a local chapter of about 80 members who work primarily at LLNL and Sandia. The society is open to scientists who have done original research. The local chapter has co-sponsored the Lab's "Science on Saturday" series and participated in judging at the Tri-Valley Science and Engineering Fair.

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The Employment and Organization Development Division

The Employment and Organization Development Division (EODD) of Human Resources offers tools that enhance the capability of Laoratory employees and organizations to meet the dynamic challenges of current and future missions. We provide individual and group services in the areas of:

- Career Management
- Training and Development
- Distance Learning
- Leadership and Management Development
- Mentoring
- Human Resources Consultants
- Organization Development
- Complaint Resolution

Mammoth Find at the National Ignition Facility Construction Site

Carol Kielusiak

In December 1997, workers at the construction site of the National Ignition Facility at Lawrence Livermore National Laboratory uncovered mammoth bones. The project under construction will be the world's most powerful laser when it first begins operations in 2001.

After discovery of the bones, the small area surrounding the bones was immediately cordoned off. The curator from the University of California Museum of Paleontology visited the site the next day and identified the find as a mammoth jawbone and partial skull. Within the next several days, a National Park Service representative from the Department of the Interior visited the site several times to review the recovery procedures developed by the paleontologist hired as a consultant to LLNL, and to work with the Department of Energy representative in preparing a permit application for the recovery. The Department of the Interior Federal Antiquities Permit was granted, and the recovery was begun within one week of the find.

The scene of the recovery was a vivid contrast between the paleontologist and his team of archaeologists, geologists, biologists, photographers, support and safety staff using traditional small hand tools, such as shovels, trowels, and brushes on extracting the delicate bones of a Pleistocene mammal, and the construction labor force working in this stadium-sized facility excavating the site with large earthmovers and hauling large steel rebar cages using 100-ton cranes. The recovery team worked long days around Christmas, often into the evening, using construction lights to illuminate the night digging. Because of the excellent coordination among the participants, all the bones were carefully recovered without any construction delay.

The final recovery included jawbones and teeth, partial skull, a tusk, several vertebrae and ribs associated with a single animal determined to be approximately 14,000 years old. The Smithsonian Institution, offered first right of refusal for the bones in accordance with the Antiquities Act of 1906, declined in favor of the Department of Energy. In turn, the Department of Energy granted curatorship of the bones to the University of California Museum of Paleontology. In the near term, the bones will be preserved by the paleontologist and then catalogued by the Museum staff for storage. In the long term, the Museum will be asked to lend them to the University of California Lawrence Livermore National Laboratory for display in the National Ignition Facility lobby. This display would highlight the contrast between past and future at the National Ignition Facility site.

The Department of Energy was delighted with the find and the subsequent recovery. The Director of the Office of the National Ignition Facility at Department Headquarters in Washington DC said, "This find is the first scientific discovery by the National Ignition Facility." The Project Manager at the University of California added, "this has been a valuable and unique scientific experience for all of us."

This recovery of ancient bones demonstrated excellent cooperation and communication between agencies of the Federal Government and the University of California.

Lawrence Berkeley National Laboratory Highlights

Adele Ahanotu – LBL contact

The Ernest Orlando Lawrence Berkeley National Laboratory is the country's oldest national laboratory, founded in 1931 on the UC Berkeley campus by E.O. Lawrence, a UCB professor. Nine Nobel prize winners did their science at the Berkeley Lab – five in physics and four in chemistry. The Berkeley Lab has the 88-Inch Cyclotron, the world's most productive user facility for low-energy nuclear physics. The 88-Inch is a versatile accelerator of ions as light as hydrogen and as heavy as uranium. The Berkeley Lab is a partner in one of the nation's largest consolidated efforts to sequence the human genome – the Joint Genome Institute. The Berkeley Lab is also home to the National Institute of Health's effort to sequence the genome of that venerable "model organism," the fruit fly. The Earth Sciences Division conducts research in the flow of water, microbial activity, and the properties of materials in subsurface – important in fighting contamination and safely sequestering the nation's nuclear wastes. The National Center for Electron Microscopy has two of the world's most advanced microscopes: the three-story high Atomic Resolution Microscopy, the first in the world to produce pictures of individual atoms, and the High-Voltage Electron Microscopy, the highest-voltage instrument in the United States, operating at up to one and a half million electron volts. The Advanced Light Source, the Lab's largest user facility for scientific research and development, produces the world's brightest "soft" X-ray and ultraviolet light. The National Energy Research Scientific Computing Center, NERSC, is the most powerful unclassified computing center in the country.

Berkeley Lab interacts with the private sector in a growing number of collaborative research projects intended to transfer research know-how into the national economy. A number of corporations supply both funding and expertise for many joint projects that range from building the next generation of semiconductors to developing new tests for heart disease to the development of new materials for industry. Research at the Berkeley National Laboratory ranges across the panorama of science.

LLESA

Cynthia Rose

LLESA, Inc. is contracted by the Lab to provide a wide array of services for employees and families of LLNL, DOE, Sandia, and their contractors. We provide high-quality services that are convenient, and that save employees time and money. LLESA has a childcare program, an employee store, and numerous exercise options including aerobics, swimming, yoga, and a walking program. We coordinate over forty employee activity groups that focus on recreational, educational, cultural, and social interests. We host several annual special events (e.g., Vintage Vehicle Show, Merry Olde Holiday Faire), family picnics (locations such as Great America, Marine World Theme Park, and Santa Cruz Boardwalk), as well as the on-site Blood Drive for Alameda County. We also arrange for recreational travel discounts for individuals and groups. Our programs respond to employee requests, helping them reduce stress and increase their ability to focus at work.

Come by the LLESA booth to learn more about your Employee Services Association's time-saving services, and for some exciting free items including, 5-minute chair massages, free ticket for a prize drawing at the annual Holiday Faire, a free pass to the new Body Pump exercise class, a free LLNL water bottle (bottles in limited supply), and a pair of free tickets to the Nov. 14th Stanford football game.

LLNL Women's Association

The LLLWA is an education, discussion, and action group concerned with issues of interest to Laboratory employees with an emphasis on women's issues and interests. The LLLWA is also a resource for improving the quality of women's work life by providing encouragement and support for professional growth through new opportunities, education, information exchange and community outreach.

The Association has four officers: President, Vice President, Secretary, and Treasurer. LLLWA currently has 300 members.

The goals of the LLLWA are to:

- Celebrate successes and achievements.
- Provide collaborative solutions to remove barriers that restrict opportunities.
- Provide funding and access for educational scholarships.
- Provide sources of information and channels of communication to facilitate diversity in the workplace.
- Provide educational resources to increase knowledge and expand career opportunities.

More specifically, the LLLWA program is designed to:

- Facilitate educational opportunities for all people with emphasis on fulfilling women's needs.
- Emphasize the contributions that women have made to the Laboratory.
- Help further the contributions of women today and tomorrow.
- Collaborate with management to address issues of concern to women.
- Provide an organizational structure for networking.
- Work with others to facilitate diversity in the workplace.

The LLLWA actively and proudly supports the annual Women's Technical and Professional Symposium. Many Association members are personally involved with this year's coordination efforts and presentation sessions.

A booth at the symposium will increase awareness and visibility. Through literature, displays, and the presence of members on hand to answer questions, we hope to provide information that will inspire both men and women to join and be part of the LLLWA.

The EYH Consortium: Expanding Your Horizons in Science and Mathematics Conferences

Gayle Pawloski, EYH Consortium Chairperson

Expanding Your Horizons in Science and Mathematics conferences are day-long conferences designed to provide 6th through 12th grade young women with a program that is fun, provides enthusiastic women role models, has hands-on activities, and promotes the importance of science, mathematics, engineering, and technology. The conferences try to demonstrate to the young women the importance of their making proactive decisions regarding their futures, rather than reacting to situations as they arise. Coordinated by the Math/Science Network, EYH conferences are held across the country to encourage young women's interest in math and science. The EYH Consortium was formed in 1993 to coordinate resources and assure that local conferences sponsored by Lawrence Livermore National Laboratory and Sandia National Laboratory/California receive the funds they need to reach as many young women in our communities as possible. The EYH Consortium's mission is to assure the fundraising is effectively performed, to distribute the funds fairly and equitably, and to assure fiscal integrity and accounting for those funds. In our region the EYH Consortium sponsors three conferences: Mills College (Oakland), Tri-Valley, and San Joaquin. We encourage you to participate in these conferences. For information please contact Gayle Pawloski (925-423-0437 or gpawloski@llnl.gov).

Fax: 925-422-7438
P.O. Box 808 L-221

Giving Effective Poster Presentations

Judy Rice

How many times have you seen a poster presentation that was so filled with information that you couldn't figure out what the presenter was trying to say?

How often have you become uninterested in a poster session because the terms used were beyond your understanding?

In this poster session on poster sessions, you will learn the elements for giving an effective poster presentation. You've heard the expression "less is more"—this applies to poster sessions. The key is to keep the words and graphics clear, concise, and eye-catching.

Biography

Judy Rice has been a Graphic Designer at LLNL for 19 years. Design projects include displays for the Global Demilitarization Symposium '98 and Supercomputing '97, as well as brochures, posters, and logos for the security awareness (SAFE) program, ES&H (Environment, Safety, and Health), energy and water conservation campaigns, and the HOME (Helping Others More Effectively) campaign.

Judy has a degree in Art and has studied Mass Communications and Marketing Communications at California State University, Hayward. She recently earned a B.S. in Organizational Behavior from the University of San Francisco.

Judy has won awards from the National Association of Government Communicators, the International Association of Business Communicators, and most recently from the Society for Technical Communication.

Keywords: Posters, presentations, communication

Speaking, Writing, and Communication

Mary Spletter, Communications Specialist, Technical Information Department

How well you speak, write, and communicate can play a significant role in how far you will advance in your career. In many areas of the Laboratory, communication skills also impact your ability to perform your job and get along with and lead others. Time spent keeping your grammar and presentation skills up-to-date is a wise investment.

This poster outlines ten common communication errors people make in their written and spoken communication. The errors have been heard in written or verbal exchanges across the Laboratory. Take a look and see if any of the common pitfalls are problem areas for you. They are all easy to fix.

Work performed under the auspices of the U.S. Department of Energy by Lawrence Livermore National Laboratory under Contract W-7405-ENG-48.

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Sandia Women's Committee

Sandy Ferrario –Sandia contact

The mission of the Sandia Women's Committee (SWC) is to promote participation in outreach activities that encourage women and girls to pursue careers in technical fields, such as science, mathematics, and engineering. SWC encourages in-reach activities that increase hospitality at Sandia toward all women employees, promote corporate values and propose new or revised policies and procedures that will assist Sandia in becoming a model employer. SWC also maintains an interface with their counterpart in Sandia/New Mexico as well as other outreach groups at Sandia/California. High profile activities that SWC supports are the Math Science Award Banquet, Take Our Daughters to Work, and Expanding Your Horizons in Science and Mathematics.

Sessions III and IV Professional Development Workshops

Salon A-Morning

Building a Winning Proposal

Craig R. Wuest, Deputy Associate Division Leader, Proliferation Detection and Defense Systems, Lawrence Livermore National Laboratory, Adjunct Associate Professor, University of California, Davis

Proposal writing and presenting is a ubiquitous and sometimes dreaded part of professional research. However, by mastering the process, one can gain confidence and the means necessary to ensure a successful scientific or engineering career. What makes one proposal better than others? How does one go about structuring a written proposal and oral presentation for maximum impact and success? We'll discuss these points and others using real examples of recent successful and not-so-successful proposals and presentations submitted at LLNL within the LDRD Program.

Biography

Dr. Wuest is a senior staff physicist with 15 years of experience at Lawrence Livermore National Laboratory. Dr. Wuest's research has focused on applying new materials and modern fabrication techniques to the next generation of high energy and nuclear physics detectors. As a member of the LLNL Physics Department, he led a group of physicists and engineers in the experimental program at the Superconducting Super Collider Laboratory in Texas. In 1994 he established two new high energy physics programs at LLNL, one on the BABAR Detector at the Stanford Linear Accelerator Center B Factory, and the other on the Compact Muon Solenoid (CMS) Detector at the Large Hadron Collider at the European Laboratory for Particle Physics (CERN).

Recently, Dr. Wuest joined the Nonproliferation, Arms Control and International Security (NAI) Directorate at LLNL as Deputy Associate Division Leader for the Proliferation Detection and Defense Systems Division. His principal responsibility is to develop the LLNL National Ignition Facility (NIF), a 192-beam 1.8-MJoule Laser as a radiation effects experimental facility in partnership with the Department of Energy and the Defense Threat Reduction Agency.

Dr. Wuest has served as a member of the DOE Defense Programs Science Council working on the US Stockpile Management Plan and DOE Educational Outreach Program. He has also pursued R&D on land mine and weapons detection/disablement along with detection and disablement of all types of weapons during his tenure at LLNL. Dr. Wuest holds four patents in various detector technologies and is a recipient of the 1989 Bruno Rossi Award for High Energy Astrophysics for his work on the discovery of the neutrino burst associated with Supernova 1987A.

Salon B-Morning

Non-traditional Career Trajectories Panel Discussion

Eileen Vergino, Nancy Suski, Susan Stoner, Erica Von Holtz, and Elaine Chandler

Ever wonder if there is only a single path to a successful fulfilling career, and whether you'll ever find it? Each of the women on this panel has taken a different road and some might call these roads unique, unusual, non-traditional and so on. It's not important what you label it, what is important is what they learned along the way, and they are willing to share that with you. Find out what challenges they faced during their progression, what crossroads they encountered, and whether they have any regrets. Eileen, Nancy, Susan, Erica, and Elaine are willing to share their varied stories and lessons learned, please join us.

Biosgraphies

Eileen S. Vergino

Eileen Vergino is the special assistant to the Director for the Center for Global Security Research as well as the primary contact and science advisor, representing LLNL with US Department of State for International Science and Technology Center (ISTC) and Science and Technology Center of the Ukraine (STCU).

Eileen is the former Director of Education Programs at LLNL, and was responsible for creating, planning, developing, and implementing education outreach programs for regional and national impact for students and teachers from elementary school through graduate degree programs. She worked for over sixteen years as a seismologist in the LLNL Treaty Verification Program. Her research involved seismic yield estimation and discrimination studies, and she published numerous papers on these subjects. Additionally she was the manager for the Information Management and Computational Support within the Treaty Verification Program. Eileen earned a B.S. degreee in Geophysics from M.I.T. She is married and has three children, ages 16, 14, and 7 and enjoys outdoor activities, including bicycling, running, and hiking.

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Susan Stoner is a mechanical engineer. She began working at LLNL after receiving her BSME from New Mexico State University in 1984. She pursued her masters degree via satellite from the University of California at Davis while working at LLNL and received her MSME in 1991. Susan is presently an acting group leader in the New Technologies Engineering

Division and is matrixed full time to Z Division (International Assessments), where she works on issues associated with non-proliferation in Russia. From Jan. 1994 - Aug. 1998, she was on an expatriate assignment in Naka, Japan, where she was assigned to the International Thermonuclear Experimental Reactor (ITER) Joint Central Team. Her primary responsibilities on ITER were the layout of equipment around the machine, and serving as the Naka site design integration liaison for the international team. Prior to 1994, Susan worked on materials-related projects in the Engineering Sciences Division and on the design of the physics package for the Short Range Attack Missile in the Weapons Engineering Division.

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Erica Von Holtz is a chemical engineer with an MS from the University of California at Davis. She is a member of the American Chemical Society, the American institute of Chemical Engineers and the Society of Women Engineers. Erica has over 12 years combined experience in technology, program development, and diversity activities. Currently conducting applied research, engineering development, and process scale-up in Molten Salt Oxidation for the management of mixed wastes. She has spearheaded projects involving Paste Extrudable Explosives and Extrusion Cast Explosives, including numerous systems-related programs. Erica chaired LLNL's DOE-mandated High Explosives Safety Committee. She also managed the Women's Issues Program for its first 3 years. Erica co-chaired the Diversity Action Team for Opportunity and is a responsible, self-motivated, team player who values and promotes diversity and teamwork to attain organizational goals.

Salon C-Morning

Negotiating for Your Life

Nicole Schapiro, Nicole Schapiro and Associates

Participants in this session will learn what "negotiating in a technological world" means in a competitive environment, as well as skills to recognize and overcome "old messages" that stop us from negotiating a move and/or a change. Take home strategies and skills to prepare for the best negotiation outcome to enhance your career. Recognize the different negotiation styles—yours and theirs—and learn to act versus react, thus keeping control of your career. Participants will gain more confidence and skills in knowing "when to talk and when to walk" while developing and keeping long-term work-related relationships.

Keywords: career, negotiation

Biography

At age fifteen, Nicole Schapiro, a native of Hungary, immigrated alone to the United States. Speaking no English and without funds, she lived as a homeless person in New York City for one year. Through negotiating, her persistence culminated in scholarships to the University of Chicago, where she received her B.S. in psychology. Subsequently, she earned her M.A. in industrial psychology from New York University.

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Her 26 years of experience have helped her to adopt the motto "Shift Happens" and have enhanced her ability to teach others about living life through change.

Salon G-Morning

Keys to Successful Communication: Dealing with Difficult People

Jean-Marie Grumet

We all experience them...people who are difficult to talk with or situations we'd do practically anything to avoid. During this session, you will discover communication tips and techniques to help you manage those uncomfortable circumstances with greater ease and success.

Learn to:

- Handle people who push your buttons
- Recognize what someone's body language says...that their mouth isn't
- Deal with emotions...yours and theirs
- Set better communication boundaries
- Create win-win communication connections

Biography

Jeanne-Marie Grumet is president of Communication Catalysts in Greenbrae, California, specializing in communication training and coaching. She has developed and delivered communication seminars including presentation skills, interpersonal communication, and sales and management programs. Supported by eighteen years of proven success in a variety of environments, Ms. Grumet is knowledgeable and animated and shares her experience and expertise in very creative ways.

Ms. Grumet's accomplishments include individual presentation coaching of business and political leaders, the recruiting, training and managing of a national telesales force, and being instrumental in developing a training partnership between two major corporations. Throughout her career she has received numerous sales and other achievement awards.

Ms. Grumet received her B.A. from California State University, Long Beach where she was honored as the Outstanding Psychology Student. She is a life member of the California Honor Society and Phi Kappa Phi and a faculty member of the Advanced Management Institute, an Engineering and Architecture graduate business school in San Francisco.

Salon H-Morning

This is Your Life: How to Get What You Want from a Job Interview

Karen Kline

Many of us trade more than 40 hours a week of our lives for a paycheck. No other personal financial transaction—buying a house or a car, playing the stock market—can compare to the magnitude of this investment. Yet, when the time comes to interview for a new job, we often spend more time worrying about the interview process than preparing to get the outcome we want: a job that is worth the time we put into it.

The key to getting a job that fits your professional goals begins with doing the homework. By answering the questions What do I have to offer? and What kind of job do I really want? participants in this interactive workshop will build self-analysis tools that they can customize for any job interview. Participants will roleplay tough interview scenarios to put their answers to the test.

Biography

Karen Kline is a technical writer and developmental editor with more than fifteen years of experience in the technical communications field. Karen came into the field as a course developer and trainer with a background in multicultural training. Her extensive overseas experience includes assignments in Botswana, Brazil, and England. She is currently employed at Lawrence Livermore National Laboratory, where she works as a developmental editor and documentation project leader for large-scale scientific and engineering programs. Karen holds a B. A. in International Studies from the American University, an M.L.S. in Library Science from Catholic University of America, and an M. A. in Linguistics from Stanford.

Salon A-Afternoon

Dividing Life's Pie: Creating Balance

Michelene Ottery

As we approach the beginning of the 21st century, more and more demands are impacting our professional and personal lives. How might you revise your recipe of time? You will have the opportunity to:

- Assess your values
- Compare current and ideal slices of time
- Consider personal realities
- Strategize ways to change "slices"
- Digest food for thought

Biography

Michelene has worked in the Human Resources Department at Lawrence Livermore National Laboratory since 1990 as a Human Resources Specialist in the Employee and Organization Development Division. She helped establish the Lab's Career Center, and was a trainer and a counselor in subjects of career development, work/life balance, and change management. In addition, Michelene partnered with the Telecommunications Systems Department to create their Staff Development Program.

Prior to coming to the Lab, Michelene taught Public Speaking at California State Hayward and was the Director of Research for an executive search firm. She earned her BA and MA in Speech Communication and also holds certificates in Organizational Development, Mediation, and Management.

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Salon G-Afternoon

Industrial Partnering Panel Discussion

Sheila Vaidya, Barbara Peterson, and Norma Dunipace

What about LLNL makes it either easy or hard to work with industrial partners? What unique qualities does LLNL, as a National Laboratory, have that influence the way in which we partner with outside organizations? Hear the answers to these and other questions from a panel of women with direct experience in this arena. Join us as Sheila Vaidya, Barbara Peterson, and Norma Dunipace discuss their individual "adventures" in this relatively new area.

Biography

Norma Dunipace

Norma Dunipace is Manager for Partnership Development at the Lawrence Livermore National Laboratory (LLNL), Office of Industrial Partnerships and Commercialization. Ms. Dunipace leads a staff of professionals with backgrounds in technology, marketing, and law. The Partnership Development Group develops, negotiates, and drafts LLNL collaboration agreements and technology license agreements with industry. In addition to her management responsibilities, Ms. Dunipace also licenses technologies primarily in the areas of biology and chemistry. Ms. Dunipace has a Bachelor's degree in Biology and an MBA in Management and has been with LLNL for five-and-a-half years. Previously, Ms. Dunipace was a Director for Business Development with BDM International in Monterey. BDM is headquartered in McLean, Virginia.

Sheila Vaidya

In 1973, Sheila Vaidya received her M.Sc. in Physics at the Indian Institute of Technology, Kanpur, India, through a National Merit Scholarship. She was the recipient of both the Amelia Earhart Aerospace and NSF Research Fellowships before earning her Ph.D. in Materials Science at State University of New York, Stony Brook, in 1979. After graduation, Dr. Vaidya joined the Advanced VLSI Development Group at AT&T Bell Labs, until moving in July 1995 to become Director of the Advanced CVD Metals Unit at Applied Materials. In April 1996, she accepted the position of Group Vice President for Metals at Novellus Systems.

Since February 1998, Dr. Vaidya has been Program Leader for the Information Science and Technology Program within the Laser Directorate at LLNL. She brings to Livermore considerable expertise in semiconductor materials and device research, microfabrication technology, IC design, optics, and electron beam techniques.

Salon H-Afternoon

A Method to the Marketing Madness: Be successful in marketing your proposal, yourself, and the Laboratory

Erna Grasz

In the age of increased information and specialization, getting your ideas noticed, your proposal supported, or your project funded can sometimes drive you crazy. Believe it or not, there is a method to the madness. In this workshop, we will focus on developing supporting data for your ideas, establishing your credibility, positioning your proposal, and organizing and presenting your information to ensure a successful outcome with your next potential sponsor. We will identify key questions that will be asked, as well as behind-the-scenes work required before your next "big" presentation or negotiation meeting. You will walk away with a specific method to the madness of successfully marketing your own ideas, yourself, and the Laboratory.

Biography

Erna Grasz is an Electrical Engineer for Lawrence Livermore National Laboratory (LLNL) specializing in robotics and automation. Erna completed her BS in Electrical Engineering from Texas Tech University and her MS in Electrical Engineering from Santa Clara University.

She is currently a Senior Project Leader for Operations Engineering leading an organization of 55+ people who are focused on large optics assembly and handling systems for the National Ignition Facility (NIF) Project, which will be the world's largest laser and is currently under construction at LLNL. She has been the Group Leader for Engineering's Automation and Intelligent Systems group, as well as a project leader for numerous environmental and hazardous material projects over her career at LLNL.

In addition, she is a member of IEEE, serves on the Executive Committee of the Robotics and Remote Systems Division of the American Nuclear Society, and is a member of the Society of Women Engineers. She has published numerous papers and articles on robotics, automation, and intelligent systems.

In addition to her professional responsibilities at LLNL, Erna is currently engaged in developing programs to help young students and professionals develop self-confidence and maximize potential. She is accomplishing this via speaking, workshops, and educational outreach.

Closing Session-Ballroom

Closing Session-Ballroom

Letter to the Director

Please join us for this discussion of ideas and issues raised during this symposium. We will compile your thoughts, concerns, and suggestions into a constructive letter to be sent to Bruce Tarter, Director of LLNL. This is a unique opportunity to have your thoughts conveyed to senior management at the Laboratory.

Acknowledgments

Special thanks go to Tommy E. Smith, Jr., Director, Affirmative Action and Diversity Program, for sponsoring and supporting this Symposium. We would also like to thank all of our respective organizations for supporting us on our work for the Symposium.

Symposium Organizing Committees

Symposium Chairpersons

Linda Mack and Kim Budil

Symposium Consultant

Erica von Holtz

Program (Structure/Sessions)

Co-Chairs: Mimi Alford, Toni Bettencourt, and Lori Turpin
Members: Celeste Matarazzo, Corry Painter, Arleen Bradley, Kim Budil, and Mary Nijhuis
Program Consultants: Pat Chance, Rosemary Walling, and Luisa Hansen

Review and Selection

Co-Chairs: Winifred Burks-Houck, Judy Woo, and Christina Filarowski
Members: Gina Bonanno, Erna Grasz, Kim Budil, Michelene Ottery, Chelle Clements, Celeste Matarazzo, Lori Turpin, and Luisa Hansen

Call for Papers

Chair: Lori Turpin
Members: Chelle Clements, Arleen Bradley, Celeste Matarazzo, Kim Budil, and Mary Nijhuis

Publicity

Chair: Lynda Seaver
Members: Mimi Alford

WTPS Web Page

Chair: Anna McCravy

Keynote Speakers

Chair: Linda Mack

Exhibitors

Chair: Toni Bettencourt
Members: Janet Adams, Dorothy Bishop, Mimi Alford, and Corry Painter

Posters

Chair: Celeste Matarazzo
Members: Corry Painter and Mimi Alford

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Registration

Co-Chairs: Cynthia Siguenza and Michele Cardenas
Members: Karen Alexander and Sherry Hale

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Chair: Ellen Hill, Mark Costella, Cheryl Collins, Alexandria Ballard, and Carol Christopherson

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Co-Chairs: Sharon Hoard and Connie Mack
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Volunteers On-Site the Day of Conference

Chair: Katherine Fritz
Members: Chelle Clements, Mark Costella, Joanne Hawke, Sharon Hoard, Sherry Hale, Linda Mack, Karen Alexander, Cheryl Collins, Evelyn Halog, Janet Adams, Patti Zazueta, Sandi Gonsalves, Sandy Ferrario, Gail Janssen, Kathleen Martinez, Pat Matthews, Cindy Ehsan, Judy Woo, Paula Kato, Corry Painter, Connie Mack, Winifred Burks-Houck, Donald Stephenson, Jennifer Norstrom, and Lorie Valle

Videotaping of Symposium

Co-Chairs: Mimi Alford, Donald Harrison, and Ken Wyman

Book of Abstracts Production

Production: Pamela Allen

Salon B

Non-traditional Career Trajectories Panel

Nancy Suski

Nancy is currently the International Nuclear Analysis Program Manager in NAI. She has established and managed a Washington D.C. Operations Office for Fission Energy & Systems Safety Program; developed over $20 M in new business in a four year period; has extensive experience in interactions with senior DOE and NRC management; and has managed $10 M/yr Uranium Enrichment Technical Support Project.

She also has extensive experience in nuclear fuel cycle technologies including uranium enrichment, fission, fusion and waste management. Nancy has her MS in Mechanical Engineering from UC Davis and her BS in Engineering Science from Trinity University in San Antonio, TX. She completed a postgraduate study in gas dynamics, mathematics, and heat transfer at Stanford University in 1987.

Salon G

Industrial Partnering Panel Discussion

Barbara L. Peterson, Manager, Finance and Systems

M.B.A Finance and Organizational Development,
University of Southern California

B.A. Biology, University of California Los Angeles

Ms. Peterson is responsible for planning, coordinating and directing the financial management and information systems efforts for the AVLIS Enrichment Plant Project. She has had 14 years of relevant experience at both the Lawrence Livermore National Laboratory (LLNL) and in private Industry. She has an extensive background in project management and controls, financial planning and control, procurement, business policy and compliance, computer security, facility and property management, information systems and environmental, safety and health operations. Prior to joining the AVLIS program Ms. Peterson held the position of Deputy Associate Director for Operations in the Environmental Programs Directorate and prior to that, Operations Manager for LLNL's Advanced Technology Program. Ms. Peterson joined the Laboratory in 1993 after spending 11 years with TRW as business manager for a variety of Department of Defense Programs.